PCT

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04N 5/445

A1

(11) International Publication Number: WO 00/52928

(43) International Publication Date: 8 September 2000 (08.09.00)

(21) International Application Number: PCT/US00/05183

(22) International Filing Date: 1 March 2000 (01.03.00)

(30) Priority Data:
60/122,760 1 March 1999 (01.03.99) US

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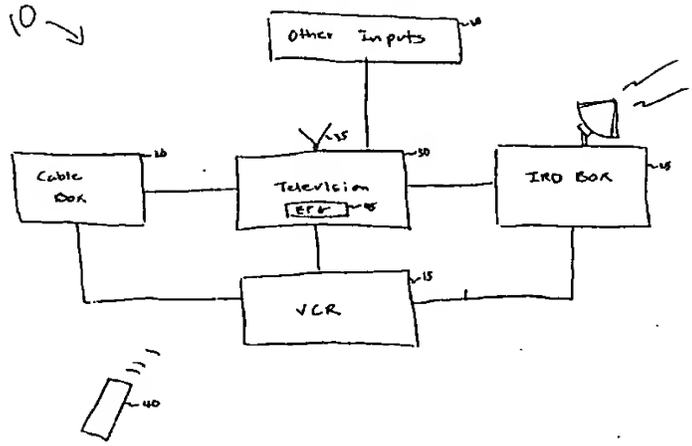
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: SYSTEM AND METHOD FOR ELIMINATING REDUNDANT LISTINGS IN AN ELECTRONIC PROGRAM GUIDE



(57) Abstract

A system and method for providing merged electronic program guides with redundant listings removed. The television system receives EPG data of television programs broadcast by a plurality of program signal sources. Such signal sources may include OTA broadcast, cable, satellite, and the like. Either the television system or a merging system separate from the television system receives EPG data including program scheduling information of television programs telecast from the various signal sources. The system further receives channel mapping information for each of the signal sources. The channel mapping information relates television channels to television stations carried by the signal sources. The system creates a merged channel map based on the channel mapping information with any duplicate television station listings removed. Each television channel is associated with a unique channel identifier. Duplicate television station listings are therefore identified by identifying duplicate channel identifiers. Duplicate television station listings may be eliminated based on a priority associated with the various signal sources, or based on the signal quality of the various sources.

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SYSTEM AND METHOD FOR ELIMINATING REDUNDANT LISTINGS IN AN ELECTRONIC PROGRAM GUIDE

FIELD OF THE INVENTION

This invention relates generally to television systems, and more particularly, to television systems with electronic program guides without redundant program listings.

BACKGROUND OF THE INVENTION

As video entertainment becomes increasingly sophisticated, consumers are provided with wider options to choose from. In addition to conventional broadcast television programs, a television viewer may now have access to cable television programming, digital satellite service programming, cable stereo broadcast, and conventional satellite programming. Moreover, each transmission media provides consumers with an increased number and variety of programs.

While benefitting consumers through greater selection, the array of programming available to consumers also presents a certain dilemma. Specifically, as the number of programs available to a consumer becomes large, the process of selecting which programs to view becomes increasingly onerous. For example, a consumer may have access to over 100 cable television channels. The process of choosing a program to view becomes even more daunting if a particular consumer has access to not only a cable source, but also other television program sources (such as a digital satellite service).

Accordingly, new and improved methods of providing program guide information have been developed for display on the television screen of the consumer's television. Such electronic program guides (EPGs) not only provide television listings, but also capabilities such as theme searching, VCR programming, detailed program information, and other functionality.

Such EPGs may further receive guide data relating to a number of different television signal sources, such as over-the-air (OTA) broadcast, cable, and satellite. The guide data associated with the different signal sources may then be merged into a single EPG. One consequence of multiple signal sources is that two or more sources may carry an identical television station. For example, both cable and satellite sources may carry a local NBC station. Displaying duplicate program guide information associated with multiple sources may unnecessarily clutter the guide, making it even more difficult to find a desired program listing.

Thus, it is desirable to have an EPG system that will allow elimination of redundant information from the EPG display.

SUMMARY OF THE INVENTION

The present invention comprises a system and method for providing a television system with a merged EPG with redundant program listings eliminated.

In one embodiment of the invention, eliminating redundant program listings from the EPG includes receiving EPG data including program scheduling information of television programs telecast from the various signal sources. Such signal sources may include OTA broadcast, cable, satellite, and the like. The system further receives channel mapping information for each of the signal sources. The channel mapping information relates television channels to television stations carried by the signal sources. The system creates a merged channel map based on the channel mapping information with any duplicate television station listings removed. According to one embodiment of the invention, the channel mapping information includes listings of television channels and their associated channel identifiers. Duplicate television station listings are therefore identified by identifying duplicate channel identifiers.

According to one aspect of the invention, duplicate television station listings are eliminated based on a priority associated with the signal source carrying the duplicate television station. For instance, priorities may be given based on the number of channel listings associated with a particular signal source.

According to another aspect of the invention, duplicate television station listings are eliminated based on the quality of the various sources. The quality may relate, for example, to the signal quality or a perceived noise created by a source.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic block diagram of an interactive television schedule system including a television and a cable box according to one embodiment of the invention;

FIG. 2 is a more detailed schematic block diagram of the cable box of FIG. 1;

FIG. 3 is a more detailed schematic block diagram of the television of FIG. 1;

FIG. 4 is a schematic block diagram of the television system of FIG. 1 operating under the control of a coordinator;

FIG. 5 is a schematic block diagram of a channel map selection packet and channel map packets;

FIG. 6 is a schematic block diagram of a plurality of source map packets;

FIG. 7 is a schematic layout diagram of a merged channel map;

FIG. 8 is a schematic block diagram of a merging system separate from the television system of FIG. 1; and

FIG. 9 is an illustration of a merged EPG screen displayed on the television system of FIG. 1.

DETAILED DESCRIPTION

In general terms, the present system and method is directed to an interactive television schedule system having a television apparatus equipped with an interactive electronic program guide (EPG) that will allow elimination of redundant information from the EPG display.

FIG. 1 is a schematic block diagram of an interactive television schedule system (television system) 10 according to one embodiment of the invention. The system includes a television 50 and a VCR 15 receiving input from a cable box 20 and an IRD box 25.

A user of the television system 10 may subscribe to and receive television programs broadcast from various television signal sources. EPG data with program scheduling information is also transmitted to the television system 10 by one or more of these signal sources. For example, EPG data may be provided via cable through the cable box 20 and/or via Direct Broadcast Satellite (DBS) through an IRD box 25. EPG data may also be received via OTA broadcast through an antenna 35 coupled to the television 50. Furthermore, the data may be transmitted through other inputs 30 such as conventional satellite systems, coax cables, telephone lines, and fibre optic cables.

The television 50 is configured with an interactive EPG 45 for displaying a merged television schedule information of television programs broadcast from the various signal sources and subscribed to by the user. The user interacts with the television 50 and EPG 45 via a viewer input device 40, preferably taking the form of an IR remote control 40, according to conventional methods. Other viewer input devices 40 might also be utilized, such as a keyboard, keypad, joystick, mouse, track ball, touch pad, and the like.

FIG. 2 is a more detailed schematic block diagram of the cable box 20 of FIG. 1 for providing EPG data to the television system 10. As illustrated in FIG. 2, the cable box 20 includes a processor 60 and a memory 65. The memory 65 of the cable box 20 stores software 70 for receiving, organizing, and displaying EPG data. The memory 65 also stores the EPG data itself. The EPG data, however, is preferably stored in a memory of the television 50 unit as is described below in conjunction with FIG. 3.

The memory 65 may further store data related to the viewer's profile and the like. In one embodiment of the invention, a portion of the data stored in the memory 65 is obtained via the Internet through a cable modem 75. Other portion of data is generated by the processor from data received from a cable head end.

FIG. 3 is a more detailed schematic block diagram of the television 50 of FIG. 1. With reference to FIG. 3, a source of television signals 100 such as the antenna 35, cable box 20, IRD box 25, or other inputs 30 carrying the television signals is connected to a television tuner 105. The output of the tuner 105 is a modulated intermediate frequency signal 110 containing video and audio television information. The tuner 105 is connected by an intermediate frequency

amplifier (IF AMP) 110 to a picture detector (PICTURE DET) 115 and a sound detector (SOUND DET) 120, that produce base band video and audio signals, respectively. The audio signal is coupled by a sound amplifier (SOUND AMP) 125 to a loudspeaker 130. The video signal is coupled by a video amplifier (not shown) to one input of a switch 135. The sound detector 120 and picture detector 115 are connected to the audio and video inputs, respectively, of the VCR 15. Alternatively, television signal source 100 could be directly connected to the RF input of the VCR 15 if its internal tuner and demodulating circuitry is to be utilized.

The output of the VCR 15 is connected to the other input of the switch 135. The output of the switch 135 is connected to one input of a conventional picture-in-picture (PIP) integrated circuit chip 140. The output of the PIP chip 140 is connected to the video input 142 of the television 50 for display on a television screen (not shown).

According to one embodiment of the invention, the television 50 illustrated in FIG. 3 includes an EPG memory 145 for storing updatable databases of EPG data including the merged television program schedule information and information relating to news, sports, and local events and businesses. The databases may be updated in any one of many conventional methods, including by a continuous data link in the vertical blanking interval (VBI) of a television channel broadcast to the television system 10.

The EPG memory 145 is connected to a microprocessor 150 that is programmed to control the operation of various system devices including the television 50. An operating program for the microprocessor 150 is stored in a read only memory (ROM) 155. The viewer input device 40 is coupled to the microprocessor 150 to provide commands from the viewer and interact with the EPG.

A video processor 160 is coupled to microprocessor 150. When the viewer wishes to see the television program schedule information, the microprocessor 150 recalls a portion of the relevant data from the EPG memory 145 and couples it to video processor 160, where the program listings are formatted for display. Preferably, the information stored in the video processor 160 is a bit map of what is displayed on the screen of television 50.

The video processor 160 is further connected to the other input of the PIP chip 140. Preferably, the viewer input device 40 controls the microprocessor 150 by cursor movement on the screen of the television 50. To this end, microprocessor 150 and video processor 160 are coupled to a cursor position register 165. Alternatively, the viewer can select items of information displayed on the screen by selecting particular keys on the viewer input device 40.

A VBI decoder 111 positioned at the output of the tuner 105 extracts data detected in the VBI and couples that data to the microprocessor 150 for processing. According to one embodiment of the invention, the VBI lines transmit channel mapping information for relating channel numbers to television stations available to the user. The microprocessor 150 includes

a channel mapping function that examines the channel mapping information and downloads the channel maps applicable to the user.

Referring back to the EPG memory 145, television program schedule information is stored in a program schedule database of the EPG memory. The program schedule database preferably includes the EPG data of television programs broadcast by the signal sources. The EPG data corresponding to these signal sources is then used to create a merged EPG guide for display on the television screen.

The merged EPG guide includes the program schedules of the television programs broadcast by the various sources for a prescribed period of time, e.g. a day or a week. These program listings typically include for each program the title, a program description, the day of the week, the start time of the day, the program length, and the channel on which the program is transmitted and thus available for reception at source 100. In a preferred embodiment of the invention, the period of time for which the program listings are stored is different for the guides, depending upon viewer priorities and preferences. For example, the information may be stored for one or two days, or for a week or more.

Information relating to news stored in a news database of the EPG memory 145 includes but is not limited to new categories, news headlines, articles relating to the news headlines, graphical images associated with the articles, and links to television programs, Internet websites, and local guide information associated with each article.

Information relating to sports stored in a sports database of the EPG memory 145 includes but is not limited to sporting categories, sporting events in each sporting category, team information, scores, statistics, point spreads, and links to television programs, video clips, Internet websites, news articles, and local guide information associated with a sporting event.

Information relating to local events, businesses, products, and services (hometown information) stored in a hometown database of the EPG memory 145 include but is not limited to categories of such hometown information (e.g. movies, theater, restaurants), description of the hometown information, business, addresses, telephone numbers, graphical images related to the hometown information, and links to television programs, Internet websites, and news articles.

According to one embodiment of the invention, the links to television programs stored in the news, sports, and hometown databases include channel, date, time, and length information of a linked television program, or a pointers to an entry of such a program in the program schedule database. The links to Internet websites include URL information to particular web pages. The links to news articles and local guide information include pointers to such entries in the new and hometown databases.

FIG. 4 is a schematic block diagram of the television system 10 of FIG. 1 operating under the control of a coordinator 200. Although the coordinator 200 in the embodiment illustrated in

FIG. 4 is depicted as a stand alone unit, the coordinator may, in alternative embodiments, be placed in the cable box 20, VCR 15, television 50, IRD box 20, or another device in communication with the television.

The coordinator 200 includes a processor (CPU) 202 and memory (RAM) 204. According to this embodiment, the channel mapping function is preferably stored in the CPU 202 instead of the microprocessor 150 of the television 50. Furthermore, the memory 204 preferably stores the EPG data instead of the television's EPG memory 145.

The coordinator 200 is connected to and controls an infrared (IR) emitter(s) 206. An IR receiver 208 connected to the coordinator 200 receives input from the viewer input device 40. In alternative embodiments, the IR emitter(s) 206 may be replaced by a bus interface, an RF transmitter, or the like.

The IR emitter(s) 206 controls one or more of the IRD box 25, television 50, VCR 15, cable box 20, and other inputs 30. Thus, the IR emitter 206 preferably acts as a remote control device by emulating remote control signals of the television 50, VCR 15, cable box 20, and/or other devices.

The viewer input device 40 also includes an IR transmitter 210 that controls the coordinator 200 via the IR receiver 208. Although, the coordinator 200 preferably performs all the necessary control functions of the system, the viewer input device 40 may work with the coordinator 200 to control the various system devices.

In creating the merged EPG guide, one or more television signal sources provide EPG data including television schedule information to the television system 10. One or more of these sources also provide channel mapping information for relating television stations to their respective channel allocations. According to one embodiment of the invention, the channel mapping information is transmitted over one or more designated television stations known as physical hosts. The channel mapping information transmitted by each physical host preferably includes the channel maps for most or all the television services carrying that physical host.

Accompanying each channel map is a channel map identifier (ID) that uniquely identifies the channel map applicable to each television service subscribed to by the user of the television system 10. Each channel map ID preferably corresponds to a zip code or group of zip codes because viewers in the same local geographic area generally receive the same OTA broadcast or subscribe to the same cable provider. Thus, a unique channel map ID may be provided for the channel map corresponding to a particular cable company servicing a particular zip code. A different channel map ID may be provided for the channel map corresponding to the OTA channels available in the same zip code.

In determining the channel maps applicable to the user's television system, the user is asked during an initial setup process to input his or her zip code. The user is further asked to

enter information about all the television services (signal sources) to which he or she subscribes. For instance, the user may be asked whether he or she has a cable box 20 and/or an IRD box 25, and may further be asked to provide information about any other television signal source being used. The user then invokes the channel mapping function stored in the coordinator 200 (or the television 50), through the viewer input device 40.

According to one embodiment of the invention, the channel mapping function causes the coordinator 200 to scan through the channels to locate a channel map selection packet preferably transmitted in the VBI portion of a television signal. The channel map selection packet preferably correlates channel map IDs to their respective signal source(s) and zip codes. A particular signal source and zip code combination may have more than one channel map ID associated with it. For instance, if two different cable companies with different channel maps service a particular zip code, each channel map will be associated with a different channel map ID.

Once the channel map selection packet is located, the coordinator 200 identifies the channel map ID corresponding to the zip code and signal source entered by the user. If only one channel map ID is identified for the zip code/signal source combination, the coordinator downloads the channel map corresponding to the identified channel map ID. If more than one channel map ID is identified for the combination, the user preferably selects the channel map which he or she would like to download. Alternatively, the selection is automatic based on information gathered during the channel scan.

FIG. 5 is a schematic block diagram of a channel map selection packet 230 and channel map packets according to one embodiment of the invention. Both channel map selection packets 230 and channel map packets 232 include a start code 234 and a stop code 236, respectively identifying the start and end of a packet. Each packet further includes a packet type code 238 identifying whether the packet is a channel map selection packet 230 or a channel map packet 232.

The channel map selection packet 230 further includes channel map selection information 240 relating channel map IDs 242 to one or more zip codes 244 and signal sources 245. Once the appropriate channel map IDs are identified based on the user's zip code and subscribed signal sources, the coordinator 200 next searches the remaining blocks of data for the start code 234, stop code 236, and data packet code 238 of the channel map packets 232. For each identified channel map packet 232, the coordinator 200 further examines a channel map ID code 246 for determining whether it corresponds to the channel map ID for the user's zip code and signal source. If it does, the coordinator 200 downloads to its memory 204 a channel map 248 with a channel lineup information. In the event that the user subscribes to multiple signal sources, the coordinator 200 preferably downloads the channel map for each signal source.

According to one embodiment of the invention, correlation of call letters of television stations (e.g. NBC, HBO, etc.) to particular television channel numbers for creating a channel lineup is done using the channel maps 248 in conjunction with one or more source maps. Each channel map 248 identifies a list of television channel numbers 250 with a channel identifier 252 composed of a source ID 252a and a reference number referred to as a guide channel number 252b. The source ID 252a identifies a source map with station call letter information. The guide channel number 252b identifies a reference number to one of the station call letters in the source map. Preferably, the coordinator downloads each of the source maps indicated in the downloaded channel maps.

FIG. 6 is a schematic block diagram of a plurality of source map packets 260 according to one embodiment of the invention. Each source map packet 260 includes a start code 262 and a stop code 264, respectively identifying the start and end of the packet. Each packet further includes a packet type code 266 identifying the packet as a source map packet, as well as a source ID 270. In addition, each source map packet 260 also includes a source map 268 of station call letters and/or network station IDs 272. Each station call letter 272 in the source map 268 is referenced by a guide channel number 270.

Different source maps preferably exist for different regions of the country. With an 8 bit guide channel number identifying the call letter of each station, up to 256 stations may be identified in a single source map. If a region allows for more than 256 stations, multiple source maps may be used for the region. In addition, a source map may only include stations carried by a particular signal source (e.g. only cable stations), or may include stations carried by multiple signal sources (e.g. both OTA and cable stations).

In the example illustrated in FIGS. 5 and 6, the channel map selection information 240 includes two channel map IDs for the cable signal source in zip codes 90000-90050 and 90210, and one channel map ID for the OTA signal source in the same range of zip codes. In the event the user has indicated a zip code within this range, and has further indicated that the user has a cable box, the user is given the choice of selecting between the two channel maps. For example, if the user subscribes to a cable company with a channel map corresponding to the channel map ID "2710," he or she would select to download this channel map.

For OTA broadcast, however, there is only one channel map in the user's zip code. Thus, the coordinator downloads the indicated channel map without further inquiry to the user. The coordinator also downloads the source map with the source ID 252a of "001" for correlating the television channel number 250 with the station call letters 272. The downloaded channel maps and source map together allow the television channels 250 to be correlated to their station call letters 272. For television channel number "2," the source map with source ID "001" indicates that the corresponding television station call letter is "ABC."

Once the coordinator 200 has identified and downloaded the channel map(s) 248 and source map(s) 268 applicable to the user, the coordinator 200 creates a merged channel map with any redundant channel listings removed. Redundant listings are preferably identified by comparing the channel IDs 252 in one downloaded channel map with the channel IDs in other downloaded channel maps. If the same channel ID 252 appears in another channel map, the listing is redundant and may be removed from one of the channel maps.

Referring again to the examples of FIGS. 5 and 6, the coordinator 200 creates a merged channel map based on the cable channel map (channel map ID "2710") and the OTA channel map (channel map ID "2712"). In creating the merged channel map, the coordinator examines the channel IDs in the OTA channel map with the channel IDs in the cable channel map, and identifies that the four channel IDs in the OTA channel map are equal to the first four channel IDs in the cable channel map. For example, both the OTA channel map and the cable channel map carry the "CBS" network station identified by channel ID "001 004". The OTA channel map carries the station on television channel number "9," whereas the cable channel map carries the same station on television channel number "14."

According to one embodiment of the invention, the coordinator 200 creates a merged channel map 280 with the redundant listings removed, as is illustrated in FIG. 7. The merged channel map 280 includes the television channel numbers 250, source IDs 252a, and guide channel numbers 252b selected from each channel map. The merged channel map 280 may also include the channel map IDs of the channel maps being used for each channel listing. In this way, the signal source of each listing may be identified.

The coordinator 200 may further sort the information in the merged channel map 280 according to any of a variety of sorting routines, including by numerical order, alphabetical order, subject matter, source, or any other predefined routine. Preferably, however, the order of listings in the merged channel map based on an extended display priority packet as described in U.S. Patent Application Ser. No. 09/473,574 (attorney docket number 36769), the contents of which are incorporated herein by reference. The merged channel map 280 then provides the channel lineup information and the program schedule information to be displayed on a merged EPG.

In an alternative embodiment of the invention, the merged channel map 280 is created using a merging system 220 that is separate from the television system 10 (e.g. at a head-end) as is illustrated in FIG. 8. Once the program schedule information has been merged and sorted according to a predetermined order, the merged program schedule information is provided to the television system 10, for example, on a satellite channel or on another transmission medium. The program schedule information is received in a format that is ready for immediate display.

The merging system 220 may receive EPG data from a variety of sources. For example, the data may be provided to the merging system 220 using a data line 201. The data line 201 may

be a line generally used for receiving television signals, such as a cable, or another type of data line such as a telephone twisted pair or an optical fiber line. The merging system 220 may also receive EPG data from a broadcast system 222. The broadcast system 222 may be a standard RF broadcast station or a satellite broadcast system. The merging system 220 may also be provided with program schedule information by manually inputting the desired data using any of a variety of user inputs 223. For example, a user may type the desired information into the system using a keyboard. The information may also be input from a recorded medium, such as a magnetic medium (e.g., floppy disk, magnetic tape) or an optical medium (e.g., optical compact disk).

The merging system 220 merges all of the provided program schedule information into a single program guide. Once merged, the program schedule information is transmitted by a signal transmitter 224 and received by a television signal receiver 225. The transmitter 224 may be a standard television broadcast station, a DBS system utilizing a relay satellite, a television cable system, or any other known signal broadcasting device. The signal may be transmitted over the vertical blanking interval of one or more television channels or transmitted over a dedicated channel.

A signal receiver 225, such as the television tuner 105, receives the merged schedule information, typically on a dedicated television channel, and displays it on a television display 206. The program information can also be provided as an overlay or a partial screen display on a user selected channel.

In creating the merged channel map via either the coordinator 200 or a separate merging system 202, various factors may be taken into account in determining which redundant listings to eliminate. According to one embodiment of the invention, priorities are attached to the various signal sources, and a listing in a channel map for a source with a higher priority is kept over a duplicate listing in a channel map for a source with a lower priority. For instance, priorities may be given based on the number of channel listings in the channel map. Channel maps with a higher number of channel listings are given a higher priority to reduce the switching from one source to another as the user switches channels. The priorities may alternatively be user-defined. Furthermore, priorities may be given on a channel-by-channel basis. For example, digital channels may be preferred over analog channels.

In a second embodiment of the invention, duplicate listings are eliminated based on the signal quality of the various sources. For example, the source with a stable picture quality may take precedence over another source carrying the same television station, but with an unstable picture quality. The stability of a picture quality is preferably measured based on mis-timed horizontal sync pulses. Specifically, a sync input signal is analyzed for the number of signal edges detected within a time interval, such as 80 microseconds. The time interval may be either fixed or programmable. Preferably, no error is flagged if the number of signal edges detected

within the time interval is one or two. However, an error is flagged if the number of edges detected is zero or three. The presence of a predetermined maximum number of errors indicates bad sync quality and hence, unstable picture quality.

Even if signals from two different sources have equal sync qualities, it may nevertheless be preferable to select one source over another based on other factors such as the perceived screen noise created by each source. Slightly snowy picture quality, for instance, is one example of a perceived noise that may not be detected by the sync quality measurement. Thus, in a third embodiment of the invention, an automatic sync control circuit in the tuner relays relative signal strength information that is used to determine whether the signal from one source is stronger than the signal from another source. The source with the strongest signal is then chosen as the source of a duplicate television station.

In a fourth embodiment of the invention the merged channel map 280 includes the channel listings from all the sources, including duplicate listings. The merged EPG viewed by the user, however, may simply include one listing indicating the television station call letters of the duplicate listings. When the user selects the television station from the merged EPG, any one of the sources carrying the selected station may be selected. Preferably, and to the extent possible, the tuner selects the source to which it is currently tuned. In this way, the switching from one source to another is minimized.

In a fifth embodiment of the invention, the EPG lists all duplicate channel listings. The user may then manually remove the duplicate listings from a channel lineup editor, and keep the listing from the desired signal source.

FIG. 9 is an illustration of a merged EPG screen 170 generated by the video processor 160 under the control of the microprocessor 150. The viewer invokes an EPG guide mode for displaying the EPG screen 170 by pressing a "guide" key on the viewer input device 40. The viewer returns to a full screen television mode by the same key or invoking a linked television program.

The EPG screen 170 is divided into a number of different display areas. A PIP window 172, a first panel ad window 174, and a second panel ad window 176 are arranged along the left side of screen 50. The remainder of the EPG screen 170 is typically occupied by an action key bar 178, a navigation bar 180, a grid guide 182, and an information box 184. In the embodiment illustrated in FIG. 4, the position of the windows, and other user interface features, including the action key bar 178, navigation bar 180 and grid guide 182, are fixed. In another embodiment of this invention, the position and size of the windows and other user interface features are customizable by the viewer.

The PIP window 172 displays real time broadcast programs or pre-recorded video clips produced by the PIP chip 140. A translucent overlay of the PIP window 172 can display a title,

channel (local number and/or station name), and status (locked or unlocked) of the PIP window 172.

The first and second panel ad windows 174 and 176 display advertisements for future telecast programs or for products and services. An advertisement for a future telecast program is linked to a time and channel of the program allowing the viewer to watch or record the program automatically by highlighting the advertisement and pressing a watch action button 178a or a record action button 178b,respectively.

Highlighting an advertisement for a product or service allows the viewer to read one or more pages about the product or service from the information box 184. Alternatively, the advertisement is linked to a time and channel of an infomercial allowing the viewer to watch or record the infomercial by highlighting the advertisement and pressing the watch action button 178a or the record action button 178b, respectively.

. The viewer accesses television program schedule information by actuating a grid button 180a from a list of menu buttons listed on the navigational bar 180. Upon actuation of the grid button 180a, the grid guide 182 displays a list of television programs with their respective channel designations 182a in a series of program tiles. According to one embodiment of the invention, the channel designations 182a indicate the corresponding signal source (e.g., cable, OTA, etc.) or the geographic region represented by the channel (e.g. local network station).

In addition to the program tiles, the grid guide 22 includes advertisement tiles 190 with virtual channel advertisements. A virtual channel ad may promote, for instance, a current or future television program. Such a virtual channel ad for a television program is linked to a time and channel of the program allowing the viewer to watch or record the program automatically.

The viewer may access news articles by actuation of a news button 180b from the navigational bar 180. Similar buttons may also be provided for accessing information about past, present, and future sporting events, and local information guide of a particular geographical area.

Although this invention has been described in certain specific embodiments, many additional modifications and variations would be apparent to those skilled in the art. It is therefore to be understood that this invention may be practiced otherwise than as specifically described. Thus, the present embodiments of the invention should be considered in all respects as illustrative and not restrictive, the scope of the invention to be determined by the appended claims and their equivalents.

CLAIMS:

1. A method of eliminating redundant program listings in an electronic program guide, the electronic program guide displaying listings of television programs telecast from a plurality of signal sources, the method comprising:

receiving electronic program guide data including program scheduling information of the television programs telecast from each of the signal sources;

receiving channel mapping information for each of the signal sources, the channel mapping information relating television channels to television stations carried by the signal sources;

creating a merged channel map based on the channel mapping information;

identifying a duplicate television station listing in the merged channel map;

removing the duplicate television station listing from the merged channel map; and

creating a merged electronic program guide based on the merged channel map.

2. The method of claim 1, wherein the channel mapping information includes listings of television channels and their associated channel identifiers, and identifying a duplicate television station listing comprises identifying a duplicate channel identifier listing.

3. The method of claim 1 further comprising displaying the merged electronic program guide.

4. The method of claim 1 further comprising transmitting the merged electronic program guide to a television system.

5. The method of claim 1, wherein the removing the duplicate television station listing comprises:

identifying a priority associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified priority is lower than the priority associated with another signal source carrying the same television station listing.

6. The method of claim 1, wherein the removing the duplicate television station listing comprises:

identifying a quality associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified quality is lower than the signal quality associated with another signal source carrying the same television station listing.

7. A system for eliminating redundant program listings in an electronic program guide, the electronic program guide displaying listings of television programs telecast from a plurality of signal sources, the system comprising:

means for receiving electronic program guide data including program scheduling information of the television programs telecast from each of the signal sources;

means for receiving channel mapping information for each of the signal sources, the channel mapping information relating television channels to television stations carried by the signal sources;

means for creating a merged channel map based on the channel mapping information;

means for identifying a duplicate television station listing in the merged channel map;

means for removing the duplicate television station listing from the merged channel map; and

means for creating a merged electronic program guide based on the merged channel map.

8. The system of claim 7 further comprising means for displaying the merged electronic program guide.

9. The system of claim 7 further comprising means for transmitting the merged electronic program guide to a television system.

10. A system for eliminating redundant program listings in an electronic program guide, the electronic program guide displaying listings of television programs telecast from a plurality of signal sources, the system comprising:

a receiver configured to receive channel mapping information associated with at least one of the signal sources, the channel mapping information relating television channels to television stations carried by the signal source;

a processor coupled to the receiver and operable to execute program instructions, the program instructions including:

creating a merged channel map based on the channel mapping information;

identifying a duplicate television station listing in the merged channel map;

removing the duplicate television station listing from the merged channel map; and

creating a merged electronic program guide based on the merged channel map.

11. The system of claim 10, wherein the channel mapping information includes listings of television channels and their associated channel identifiers, and identifying a duplicate television station listing comprises identifying a duplicate channel identifier listing.

12. The system of claim 10 further comprising a display screen for displaying the merged electronic program guide.

13. The system of claim 10, wherein the receiver is located at a head-end, and the system further comprises a means for transmitting the merged electronic program guide to a television system.

14. The system of claim 10, wherein the program instruction for removing the duplicate television station listing comprises program instructions for:

identifying a priority associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified priority is lower than the priority associated with another signal source carrying the same television station listing.

15. The system of claim 10, wherein the program instruction for removing the duplicate television station listing comprises program instructions for:

identifying a quality associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified quality is lower than the signal quality associated with another signal source carrying the same television station listing.

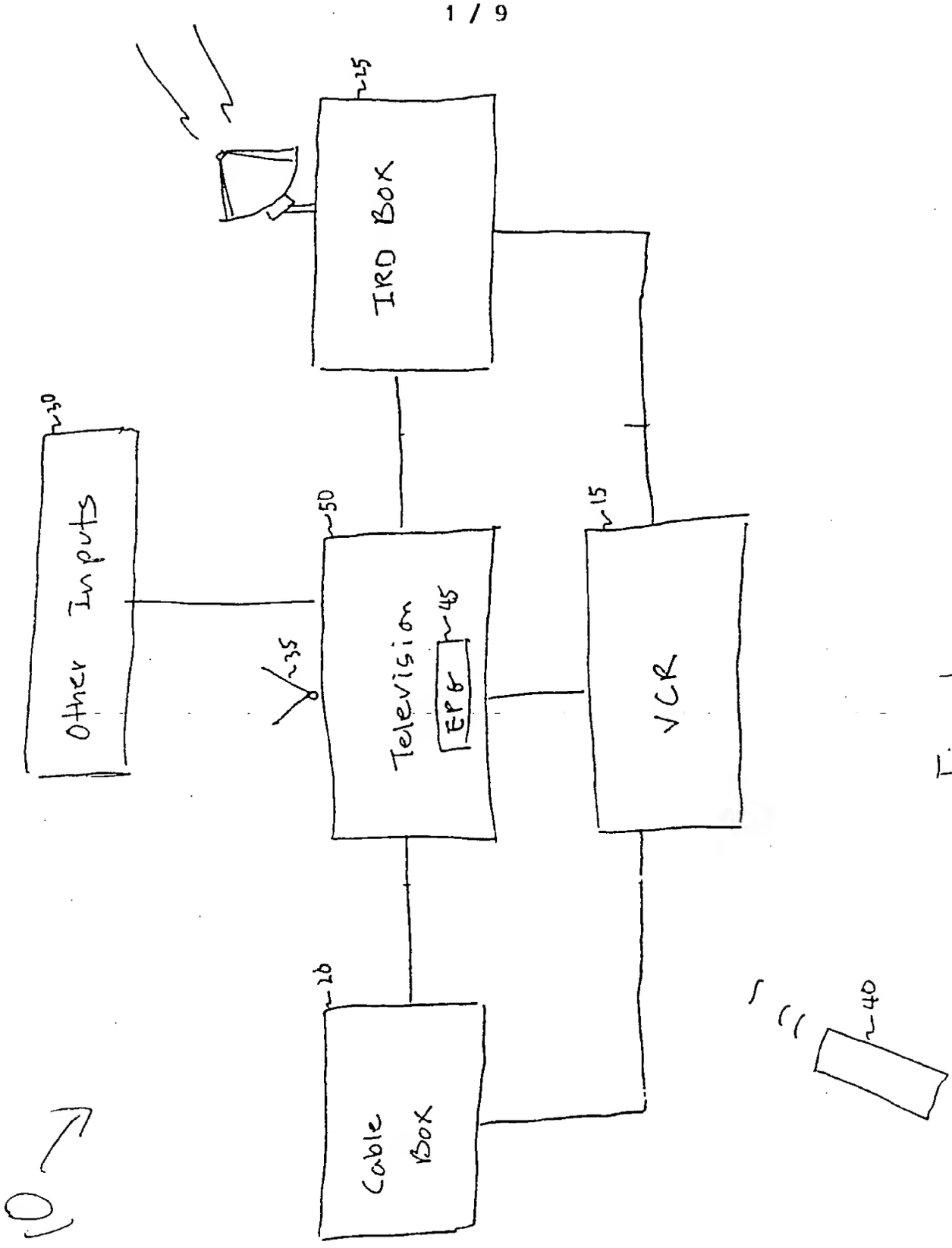
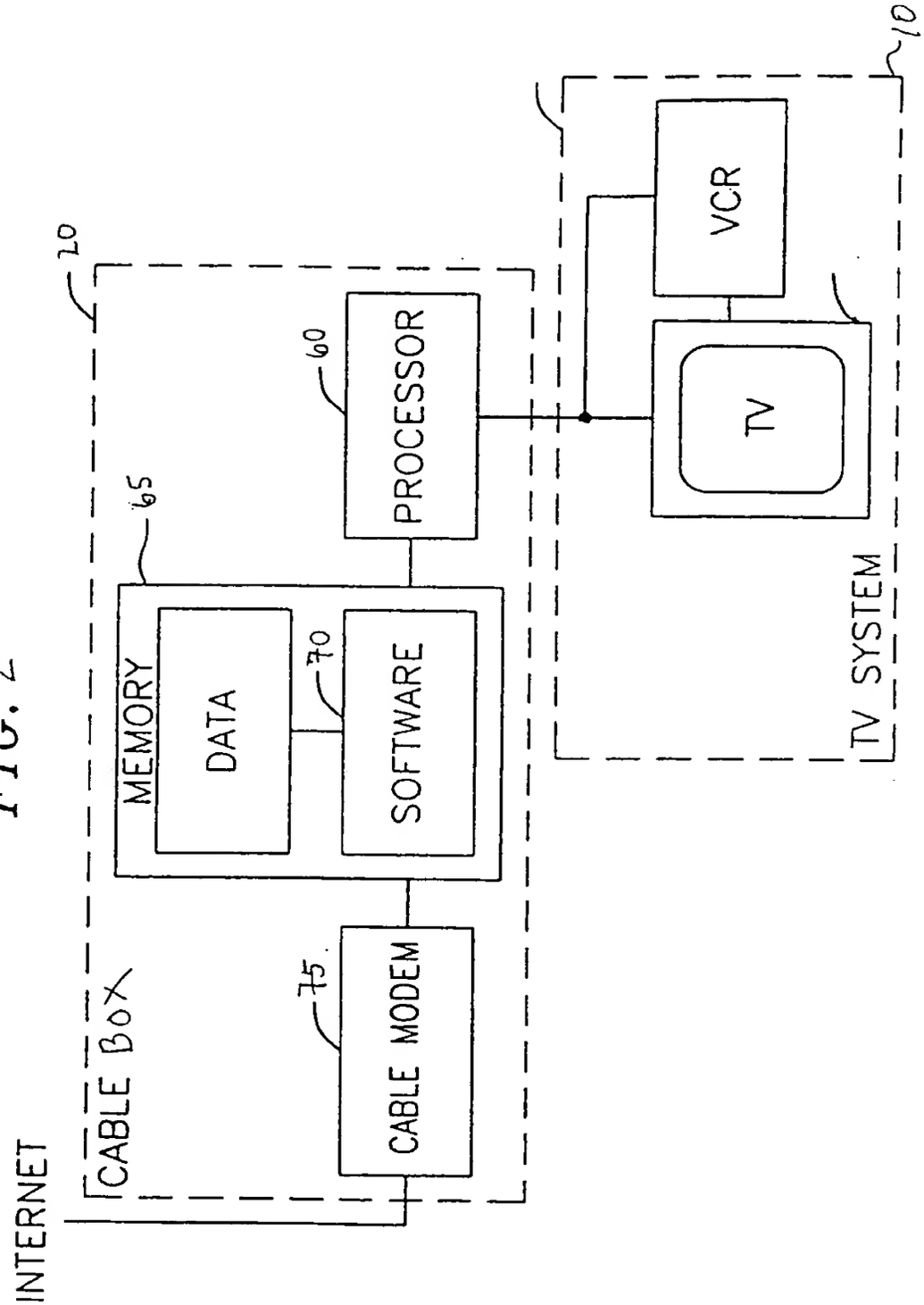

10
IRD Box
25
Other Inputs
30
Television
50
EPG
45
35
VCR
15
Cable Box
20
40

Fig 1

FIG. 2


INTERNET
CABLE BOX
20
CABLE MODEM
75
MEMORY
65
DATA
70
SOFTWARE
PROCESSOR
60
VCR
TV
TV SYSTEM
10

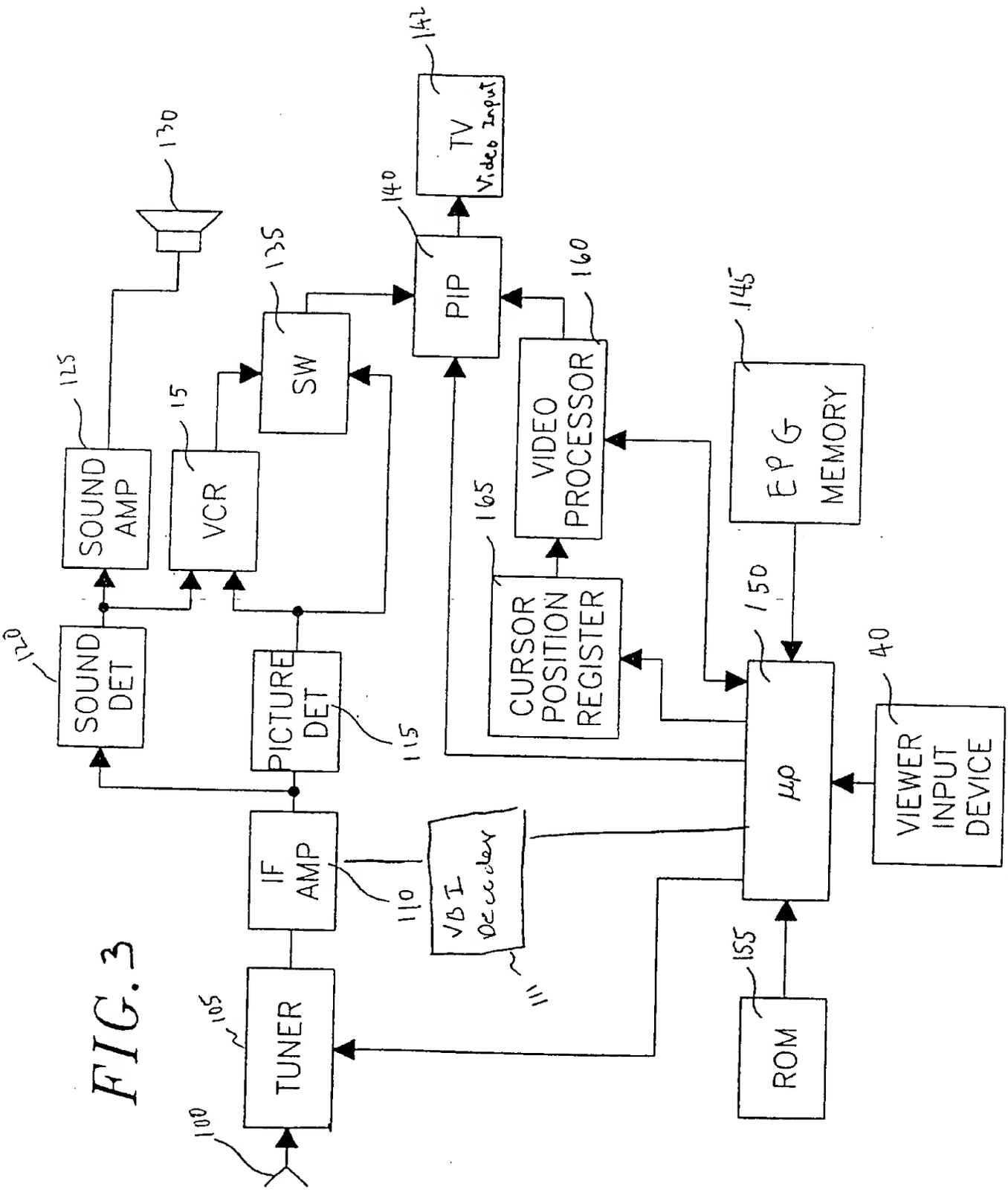

100
TUNER
105
IF AMP
110
VBI Decoder
111
PICTURE DET
115
SOUND DET
120
SOUND AMP
125
VCR
15
SW
135
130
PIP
140
TV Video Input
142
VIDEO PROCESSOR
160
CURSOR POSITION REGISTER
165
EPG MEMORY
145
μp
150
VIEWER INPUT DEVICE
40
ROM
155

FIG. 3

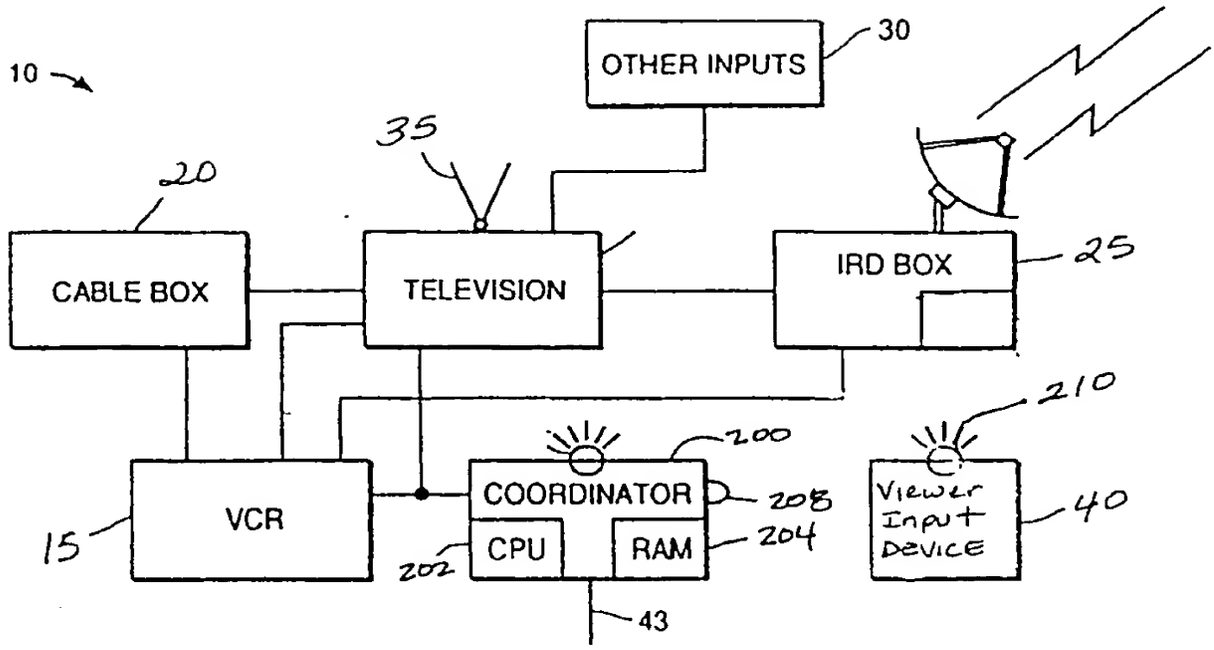

10
OTHER INPUTS
30
35
20
CABLE BOX
TELEVISION
IRD BOX
25
210
200
COORDINATOR
208
VCR
15
CPU
202
RAM
204
Viewer Input Device
40
43

FIG. 4

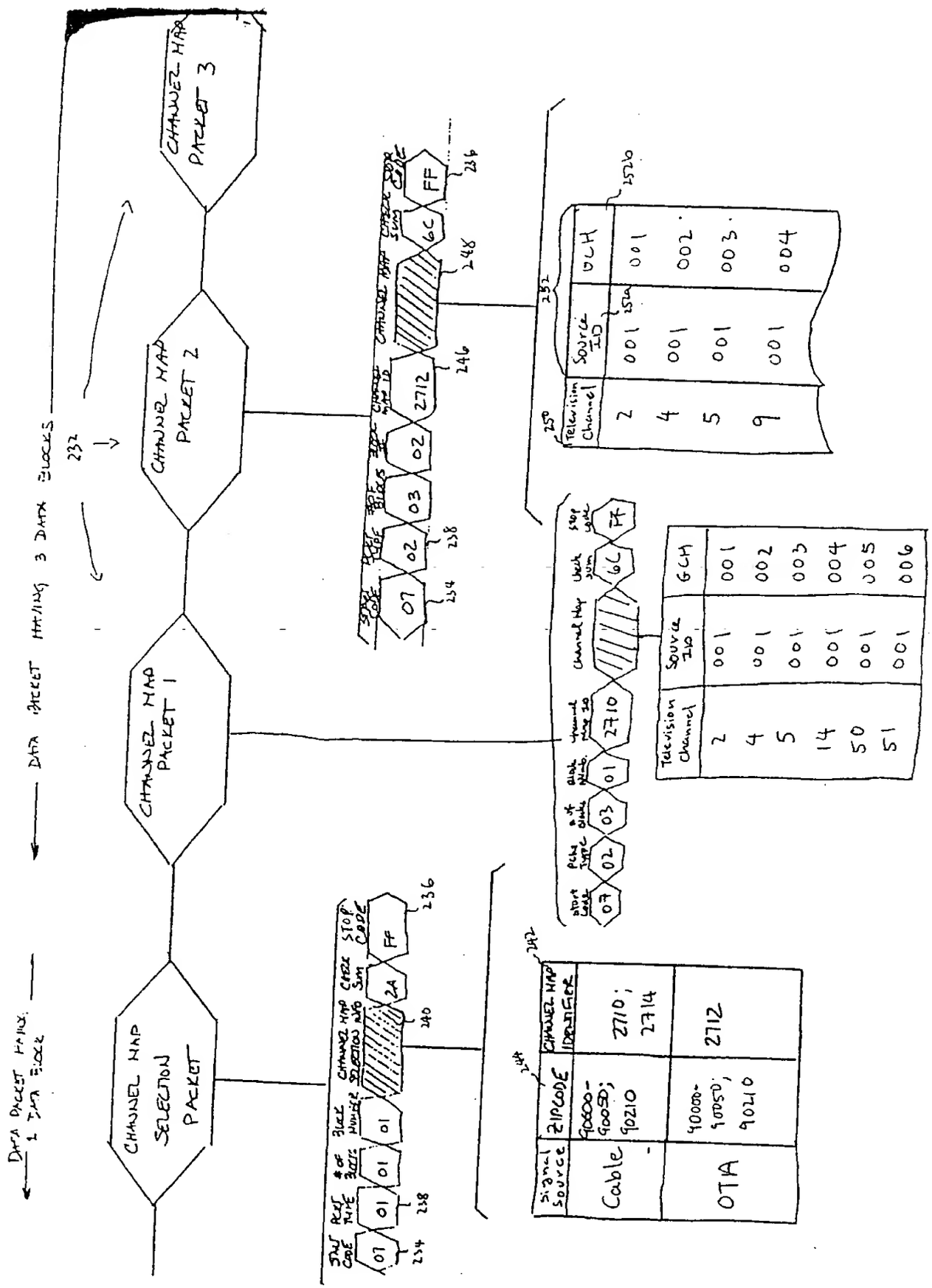

DATA PACKET MUX
1 DATA BLOCK
DATA PACKET MUXING 3 DATA BLOCKS
CHANNEL MAP SELECTION PACKET
CHANNEL MAP PACKET 1
CHANNEL MAP PACKET 2
CHANNEL MAP PACKET 3
232
234
236
238
240
242
244
246
248
250
252
START CODE
OF BLOCKS
BLOCK NUMBER
CHANNEL MAP SELECTION NUMBER
CHECK SUM
STOP CODE
CHANNEL MAP ID
CHECK SUM
Signal Source
ZIPCODE
CHANNEL MAP IDENTIFIER
Cable
90000-90050; 90210
2710; 2714
OTA
90000-90050; 90210
2712
Television Channel
Source ID
VCH
GCH

Fig. 5

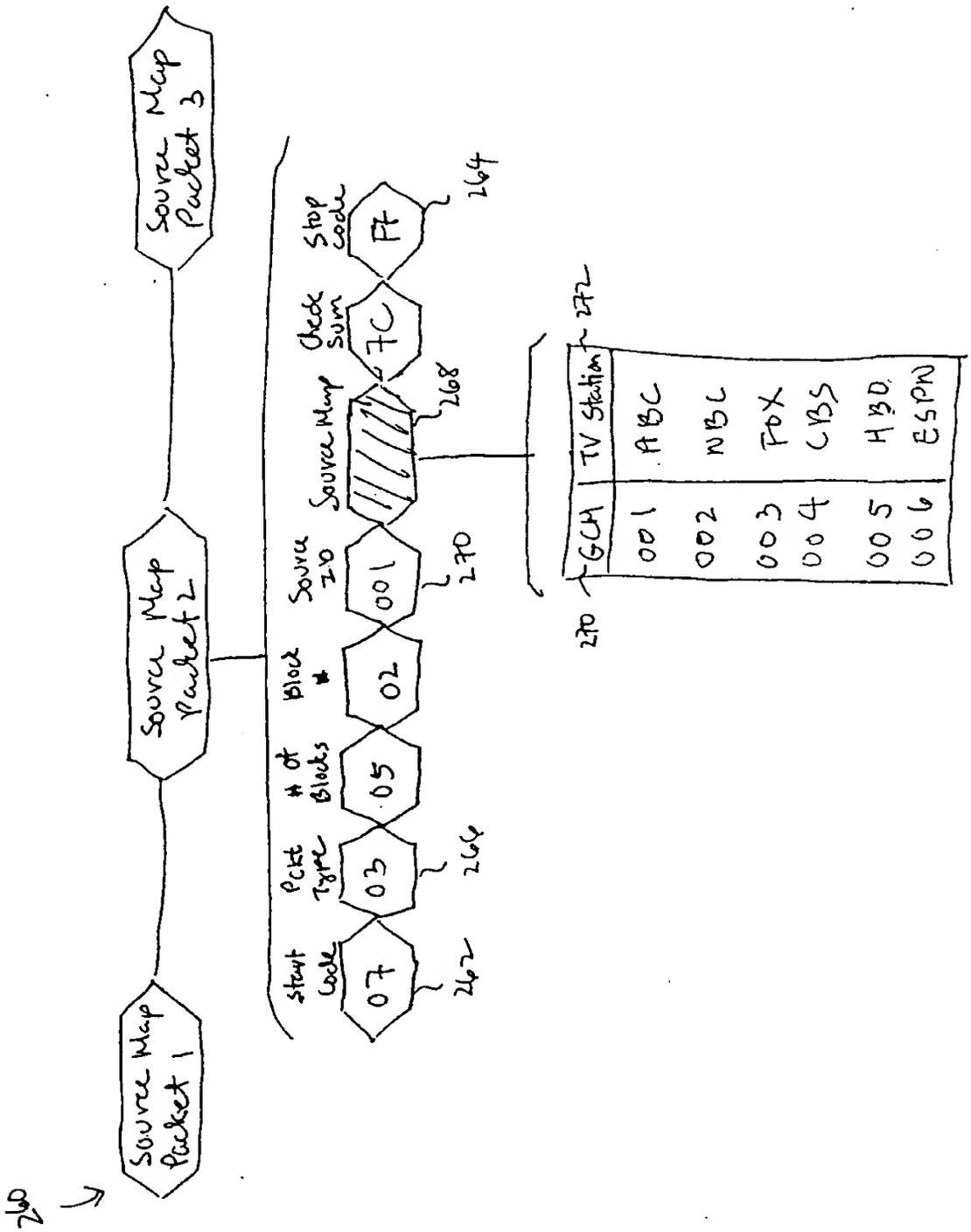

260
Source Map Packet 1
Source Map Packet 2
Source Map Packet 3
Start Code
Pckt Type
# of Blocks
Block #
Source ID
Source Map
Check Sum
Stop Code
07
03
05
02
001
7C
FF
262
266
270
268
264
270
272
GCH
TV Station
001 ABC
002 NBC
003 FOX
004 CBS
005 HBO
006 ESPN

Fig 6

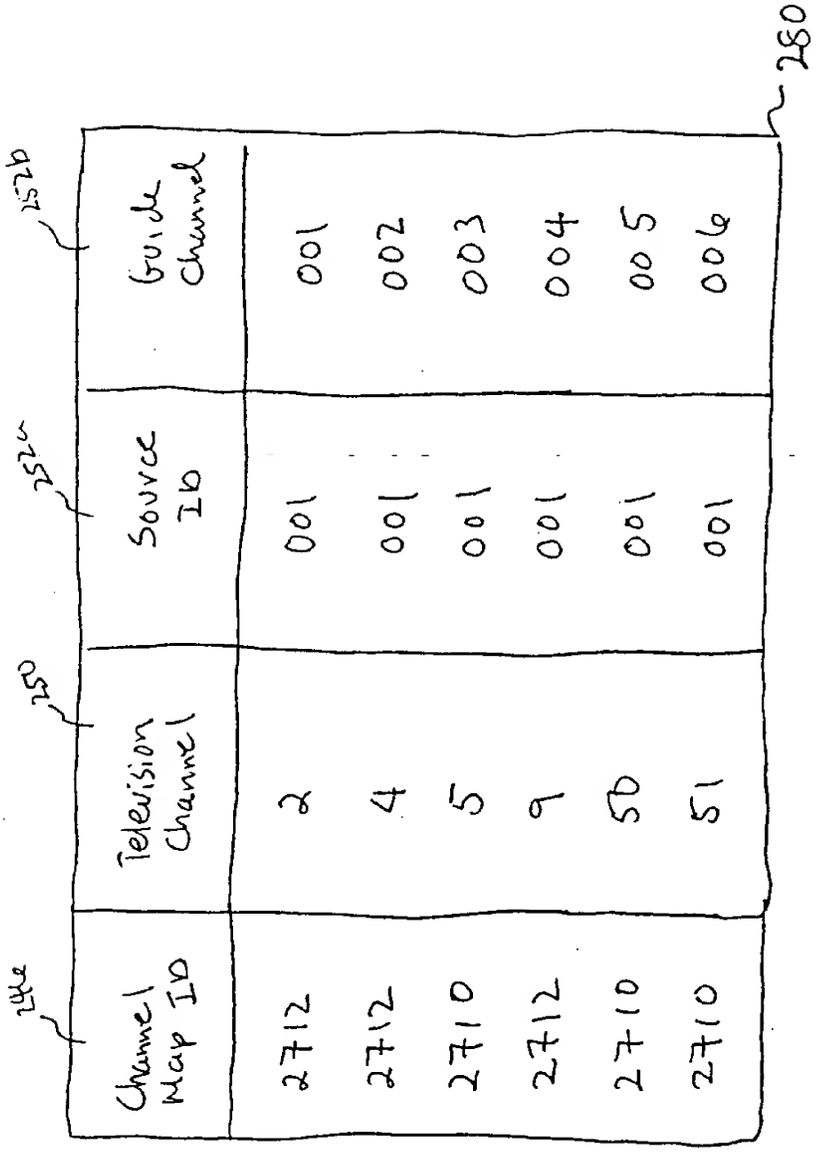
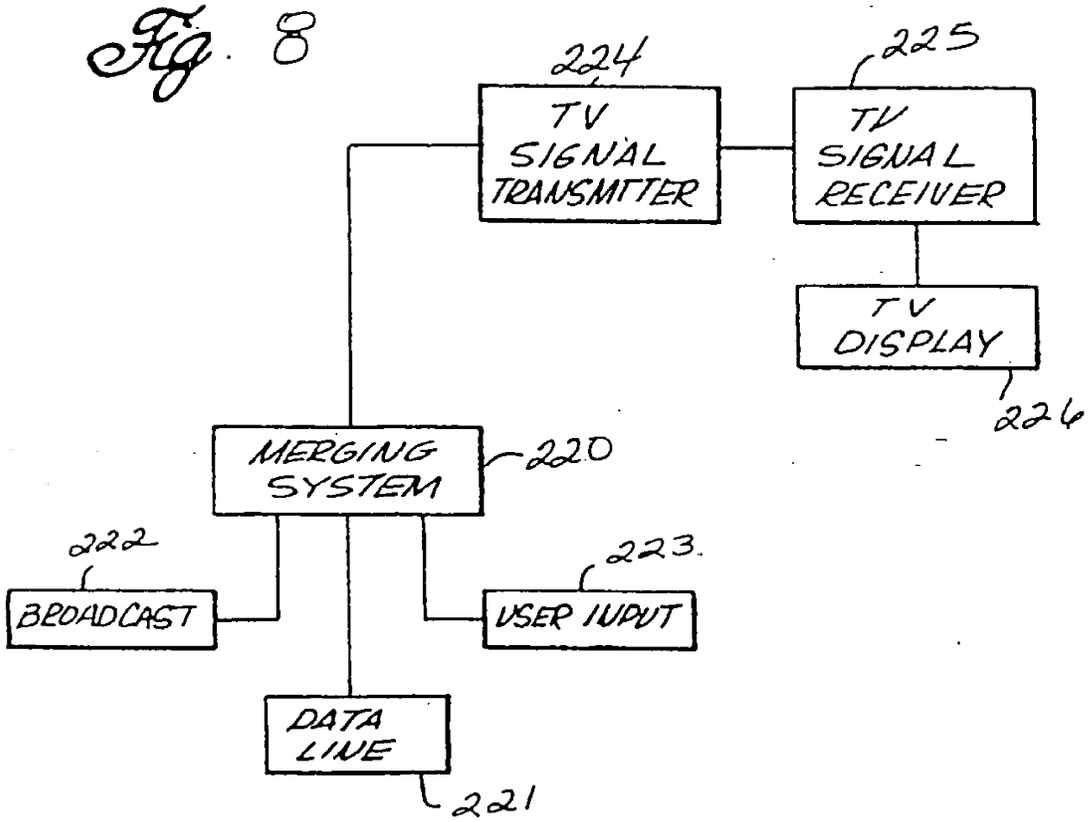

Channel Map ID
Television Channel
Source ID
Guide Channel
2712 2 001 001
2712 4 001 002
2710 5 001 003
2712 9 001 004
2710 50 001 005
2710 51 001 006
250
252
254
280

Fig. 7

Fig. 8


224
TV SIGNAL TRANSMITTER
225
TV SIGNAL RECEIVER
TV DISPLAY
226
MERGING SYSTEM
220
222
BROADCAST
223
USER INPUT
DATA LINE
221

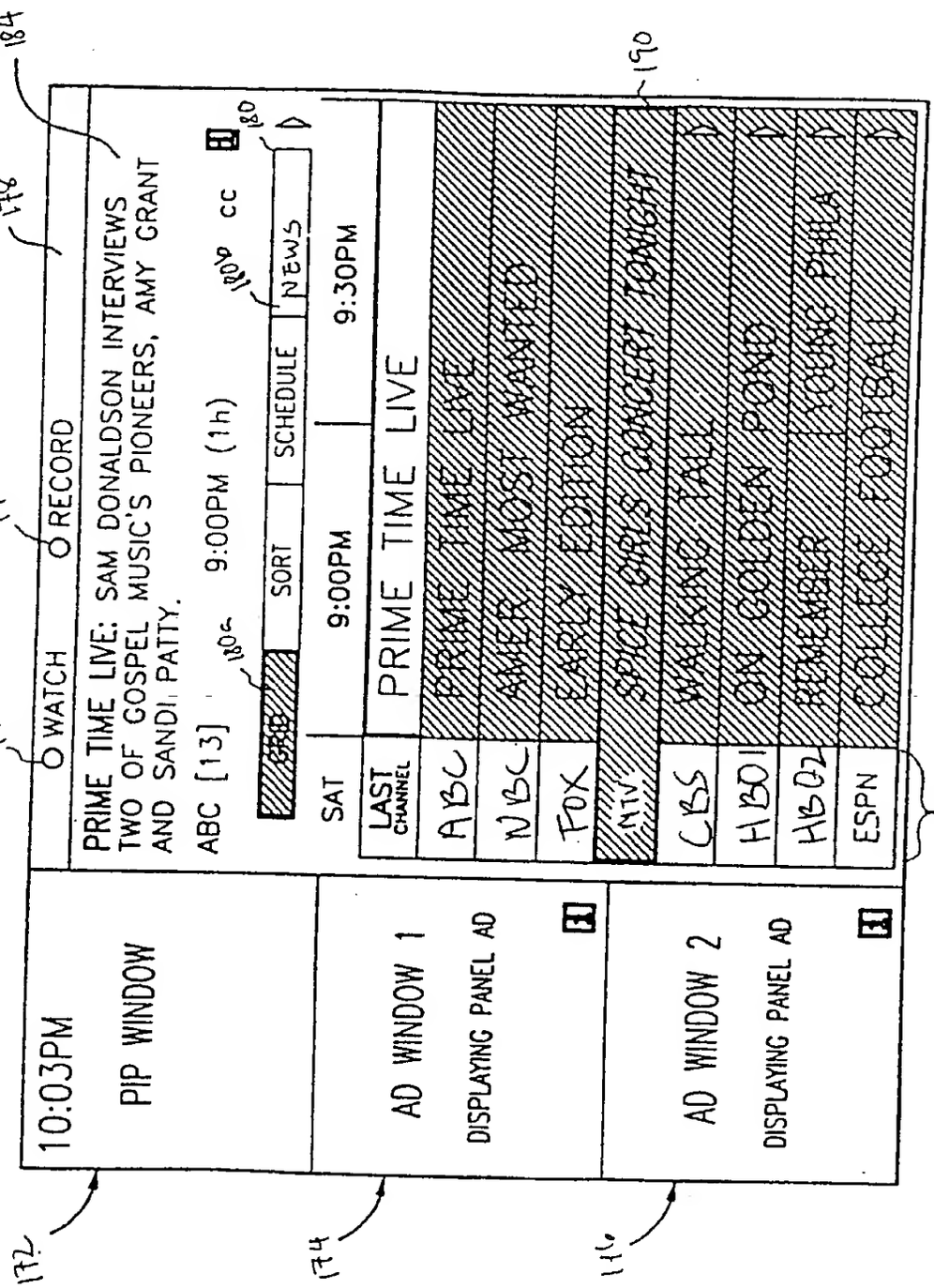

170
178
184
186
188
WATCH
RECORD
PRIME TIME LIVE: SAM DONALDSON INTERVIEWS TWO OF GOSPEL MUSIC'S PIONEERS, AMY GRANT AND SANDI PATTY.
ABC [13] 9:00PM (1h)
CC
180
180a
SORT
SCHEDULE
NEWS
180b
SAT
9:00PM
9:30PM
LAST CHANNEL
PRIME TIME LIVE
ABC
NBC
FOX
MTV
CBS
HBO1
HBO2
ESPN
PRIME TIME LIVE
AMER MOST WANTED
EARLY EDITION
SPICE GIRLS CONCERT TONIGHT
WALKING TALL
ON GOLDEN POND
REMEMBER MOUNT PHILA
COLLEGE FOOTBALL
190
182
182a
10:03PM
PIP WINDOW
AD WINDOW 1
DISPLAYING PANEL AD
AD WINDOW 2
DISPLAYING PANEL AD
172
174
176

FIG. 9

INTERNATIONAL SEARCH REPORT

Inte: ɔnal Application No
PCT/US 00/05183

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/445

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 828 945 A (KLOSTERMAN BRIAN LEE) 27 October 1998 (1998-10-27) column 3, line 31 - line 37	1,7,10
A	column 7, line 21 - line 32	2-4,8,9, 11,12
A	WO 97 25813 A (INDEX SYSTEMS INC ;CHANG ALLEN (US); KWOH DANIEL S (US); YUEN HENR) 17 July 1997 (1997-07-17) the whole document	1-15
A,P	EP 0 912 054 A (GEN INSTRUMENT CORP) 28 April 1999 (1999-04-28) the whole document	5,14

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 June 2000	30/06/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040 Tx. 31 651 epo nl	

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte. onal Application No
PCT/US 00/05183

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5828945 A	27-10-1998	US 5684525 A	04-11-1997
		US 5550576 A	27-08-1996
		US 5923362 A	13-07-1999
		AU 708574 B	05-08-1999
		AU 5443996 A	07-11-1996
		BR 9608111 A	07-12-1999
		CA 2218543 A	24-10-1996
		CN 1185257 A	17-06-1998
		EP 0821856 A	04-02-1998
		JP 11504171 T	06-04-1999
		WO 9633572 A	24-10-1996
WO 9725813 A	17-07-1997	AU 1702197 A	01-08-1997
		CN 1212807 A	31-03-1999
		EP 0934651 A	11-08-1999
EP 0912054 A	28-04-1999	AU 8950598 A	13-05-1999
		CA 2251212 A	24-04-1999
		CN 1215953 A	05-05-1999

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 September 2000 (08.09.2000)

PCT

(10) International Publication Number
WO 00/52928 A1

(51) International Patent Classification[7]: H04N 5/445

(21) International Application Number: PCT/US00/05183

(22) International Filing Date: 1 March 2000 (01.03.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/122,760 1 March 1999 (01.03.1999) US

(71) Applicant *(for all designated States except US)*: **INDEX SYSTEMS, INC.** [—/—]; P.O. Box 71, Craigmuir Chambers, Road Town, Tortola (VG).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **SCHOAFF, Peter, Christopher** [US/US]; 1 Sweetwood Circle, Westford, MA 01844 (US). **RALLIS, James, A.** [US/US]; 3 Baron Park Lane, No. 30, Burlington, MA 01803 (US). **SUTTON, Jonathon** [US/US]; 77 Temple Road, Concord, MA 01742 (US). **FISHER, Guy** [US/US]; 373 Highland Avenue, Somerville, MA 02144 (US). **RENNER, Klaus** [US/US]; 101 Rideout Road, Hollis, NH 03049 (US). **WHITEHEAD, Wensdy** [US/US]; 26D Roberts Drive, Bedford, MA 01730 (US).

(74) Agent: **CHANG, Josephine, E.**; Christie, Parker & Hale, LLP, P.O. Box 7068, Pasadena, CA 91109-7068 (US).

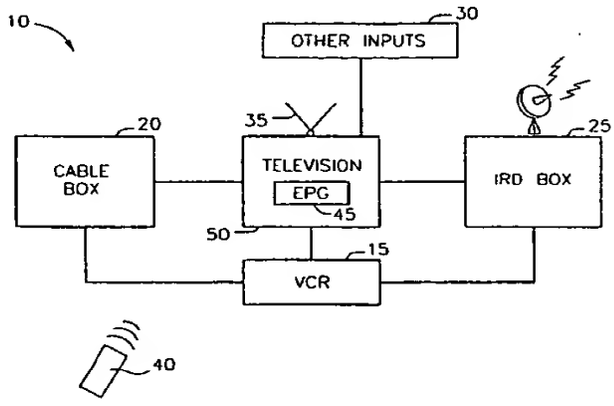
(81) Designated States *(national)*: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR ELIMINATING REDUNDANT LISTINGS IN AN ELECTRONIC PROGRAM GUIDE



(57) Abstract: A system and method for providing merged electronic program guides with redundant listings removed. The television system receives EPG data of television programs broadcast by a plurality of program signal sources. Such signal sources may include OTA broadcast, cable, satellite, and the like. Either the television system or a merging system separate from the television system receives EPG data including program scheduling information of television programs telecast from the various signal sources. The system further receives channel mapping information for each of the signal sources. The channel mapping information relates television channels to television stations carried by the signal sources. The system creates a merged channel map based on the channel mapping information with any duplicate television station listings removed. Each television channel is associated with a unique channel identifier. Duplicate television station listings are therefore identified by identifying duplicate channel identifiers. Duplicate television station listings may be eliminated based on a priority associated with the various signal sources, or based on the signal

WO 00/52928 A1

(48) Date of publication of this corrected version:
25 October 2001

(15) Information about Correction:
see PCT Gazette No. 43/2001 of 25 October 2001, Section II

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SYSTEM AND METHOD FOR ELIMINATING REDUNDANT LISTINGS IN AN ELECTRONIC PROGRAM GUIDE

FIELD OF THE INVENTION

This invention relates generally to television systems, and more particularly, to television systems with electronic program guides without redundant program listings.

BACKGROUND OF THE INVENTION

As video entertainment becomes increasingly sophisticated, consumers are provided with wider options to choose from. In addition to conventional broadcast television programs, a television viewer may now have access to cable television programming, digital satellite service programming, cable stereo broadcast, and conventional satellite programming. Moreover, each transmission media provides consumers with an increased number and variety of programs.

While benefitting consumers through greater selection, the array of programming available to consumers also presents a certain dilemma. Specifically, as the number of programs available to a consumer becomes large, the process of selecting which programs to view becomes increasingly onerous. For example, a consumer may have access to over 100 cable television channels. The process of choosing a program to view becomes even more daunting if a particular consumer has access to not only a cable source, but also other television program sources (such as a digital satellite service).

Accordingly, new and improved methods of providing program guide information have been developed for display on the television screen of the consumer's television. Such electronic program guides (EPGs) not only provide television listings, but also capabilities such as theme searching, VCR programming, detailed program information, and other functionality.

Such EPGs may further receive guide data relating to a number of different television signal sources, such as over-the-air (OTA) broadcast, cable, and satellite. The guide data associated with the different signal sources may then be merged into a single EPG. One consequence of multiple signal sources is that two or more sources may carry an identical television station. For example, both cable and satellite sources may carry a local NBC station. Displaying duplicate program guide information associated with multiple sources may unnecessarily clutter the guide, making it even more difficult to find a desired program listing.

Thus, it is desirable to have an EPG system that will allow elimination of redundant information from the EPG display.

SUMMARY OF THE INVENTION

The present invention comprises a system and method for providing a television system with a merged EPG with redundant program listings eliminated.

In one embodiment of the invention, eliminating redundant program listings from the EPG includes receiving EPG data including program scheduling information of television programs telecast from the various signal sources. Such signal sources may include OTA broadcast, cable, satellite, and the like. The system further receives channel mapping information for each of the signal sources. The channel mapping information relates television channels to television stations carried by the signal sources. The system creates a merged channel map based on the channel mapping information with any duplicate television station listings removed. According to one embodiment of the invention, the channel mapping information includes listings of television channels and their associated channel identifiers. Duplicate television station listings are therefore identified by identifying duplicate channel identifiers.

According to one aspect of the invention, duplicate television station listings are eliminated based on a priority associated with the signal source carrying the duplicate television station. For instance, priorities may be given based on the number of channel listings associated with a particular signal source.

According to another aspect of the invention, duplicate television station listings are eliminated based on the quality of the various sources. The quality may relate, for example, to the signal quality or a perceived noise created by a source.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic block diagram of an interactive television schedule system including a television and a cable box according to one embodiment of the invention;

FIG. 2 is a more detailed schematic block diagram of the cable box of FIG. 1;

FIG. 3 is a more detailed schematic block diagram of the television of FIG. 1;

FIG. 4 is a schematic block diagram of the television system of FIG. 1 operating under the control of a coordinator;

FIG. 5 is a schematic block diagram of a channel map selection packet and channel map packets;

FIG. 6 is a schematic block diagram of a plurality of source map packets;

FIG. 7 is a schematic layout diagram of a merged channel map;

FIG. 8 is a schematic block diagram of a merging system separate from the television system of FIG. 1; and

FIG. 9 is an illustration of a merged EPG screen displayed on the television system of FIG. 1.

DETAILED DESCRIPTION

In general terms, the present system and method is directed to an interactive television schedule system having a television apparatus equipped with an interactive electronic program guide (EPG) that will allow elimination of redundant information from the EPG display.

FIG. 1 is a schematic block diagram of an interactive television schedule system (television system) 10 according to one embodiment of the invention. The system includes a television 50 and a VCR 15 receiving input from a cable box 20 and an IRD box 25.

A user of the television system 10 may subscribe to and receive television programs broadcast from various television signal sources. EPG data with program scheduling information is also transmitted to the television system 10 by one or more of these signal sources. For example, EPG data may be provided via cable through the cable box 20 and/or via Direct Broadcast Satellite (DBS) through an IRD box 25. EPG data may also be received via OTA broadcast through an antenna 35 coupled to the television 50. Furthermore, the data may be transmitted through other inputs 30 such as conventional satellite systems, coax cables, telephone lines, and fibre optic cables.

The television 50 is configured with an interactive EPG 45 for displaying a merged television schedule information of television programs broadcast from the various signal sources and subscribed to by the user. The user interacts with the television 50 and EPG 45 via a viewer input device 40, preferably taking the form of an IR remote control 40, according to conventional methods. Other viewer input devices 40 might also be utilized, such as a keyboard, keypad, joystick, mouse, track ball, touch pad, and the like.

FIG. 2 is a more detailed schematic block diagram of the cable box 20 of FIG. 1 for providing EPG data to the television system 10. As illustrated in FIG. 2, the cable box 20 includes a processor 60 and a memory 65. The memory 65 of the cable box 20 stores software 70 for receiving, organizing, and displaying EPG data. The memory 65 also stores the EPG data itself. The EPG data, however, is preferably stored in a memory of the television 50 unit as is described below in conjunction with FIG. 3.

The memory 65 may further store data related to the viewer's profile and the like. In one embodiment of the invention, a portion of the data stored in the memory 65 is obtained via the Internet through a cable modem 75. Other portion of data is generated by the processor from data received from a cable head end.

FIG. 3 is a more detailed schematic block diagram of the television 50 of FIG. 1. With reference to FIG. 3, a source of television signals 100 such as the antenna 35, cable box 20, IRD box 25, or other inputs 30 carrying the television signals is connected to a television tuner 105. The output of the tuner 105 is a modulated intermediate frequency signal 110 containing video and audio television information. The tuner 105 is connected by an intermediate frequency

amplifier (IF AMP) 110 to a picture detector (PICTURE DET) 115 and a sound detector (SOUND DET) 120, that produce base band video and audio signals, respectively. The audio signal is coupled by a sound amplifier (SOUND AMP) 125 to a loudspeaker 130. The video signal is coupled by a video amplifier (not shown) to one input of a switch 135. The sound detector 120 and picture detector 115 are connected to the audio and video inputs, respectively, of the VCR 15. Alternatively, television signal source 100 could be directly connected to the RF input of the VCR 15 if its internal tuner and demodulating circuitry is to be utilized.

The output of the VCR 15 is connected to the other input of the switch 135. The output of the switch 135 is connected to one input of a conventional picture-in-picture (PIP) integrated circuit chip 140. The output of the PIP chip 140 is connected to the video input 142 of the television 50 for display on a television screen (not shown).

According to one embodiment of the invention, the television 50 illustrated in FIG. 3 includes an EPG memory 145 for storing updatable databases of EPG data including the merged television program schedule information and information relating to news, sports, and local events and businesses. The databases may be updated in any one of many conventional methods, including by a continuous data link in the vertical blanking interval (VBI) of a television channel broadcast to the television system 10.

The EPG memory 145 is connected to a microprocessor 150 that is programmed to control the operation of various system devices including the television 50. An operating program for the microprocessor 150 is stored in a read only memory (ROM) 155. The viewer input device 40 is coupled to the microprocessor 150 to provide commands from the viewer and interact with the EPG.

A video processor 160 is coupled to microprocessor 150. When the viewer wishes to see the television program schedule information, the microprocessor 150 recalls a portion of the relevant data from the EPG memory 145 and couples it to video processor 160, where the program listings are formatted for display. Preferably, the information stored in the video processor 160 is a bit map of what is displayed on the screen of television 50.

The video processor 160 is further connected to the other input of the PIP chip 140. Preferably, the viewer input device 40 controls the microprocessor 150 by cursor movement on the screen of the television 50. To this end, microprocessor 150 and video processor 160 are coupled to a cursor position register 165. Alternatively, the viewer can select items of information displayed on the screen by selecting particular keys on the viewer input device 40.

A VBI decoder 111 positioned at the output of the tuner 105 extracts data detected in the VBI and couples that data to the microprocessor 150 for processing. According to one embodiment of the invention, the VBI lines transmit channel mapping information for relating channel numbers to television stations available to the user. The microprocessor 150 includes

a channel mapping function that examines the channel mapping information and downloads the channel maps applicable to the user.

Referring back to the EPG memory 145, television program schedule information is stored in a program schedule database of the EPG memory. The program schedule database preferably includes the EPG data of television programs broadcast by the signal sources. The EPG data corresponding to these signal sources is then used to create a merged EPG guide for display on the television screen.

The merged EPG guide includes the program schedules of the television programs broadcast by the various sources for a prescribed period of time, e.g. a day or a week. These program listings typically include for each program the title, a program description, the day of the week, the start time of the day, the program length, and the channel on which the program is transmitted and thus available for reception at source 100. In a preferred embodiment of the invention, the period of time for which the program listings are stored is different for the guides, depending upon viewer priorities and preferences. For example, the information may be stored for one or two days, or for a week or more.

Information relating to news stored in a news database of the EPG memory 145 includes but is not limited to new categories, news headlines, articles relating to the news headlines, graphical images associated with the articles, and links to television programs, Internet websites, and local guide information associated with each article.

Information relating to sports stored in a sports database of the EPG memory 145 includes but is not limited to sporting categories, sporting events in each sporting category, team information, scores, statistics, point spreads, and links to television programs, video clips, Internet websites, news articles, and local guide information associated with a sporting event.

Information relating to local events, businesses, products, and services (hometown information) stored in a hometown database of the EPG memory 145 include but is not limited to categories of such hometown information (e.g. movies, theater, restaurants), description of the hometown information, business, addresses, telephone numbers, graphical images related to the hometown information, and links to television programs, Internet websites, and news articles.

According to one embodiment of the invention, the links to television programs stored in the news, sports, and hometown databases include channel, date, time, and length information of a linked television program, or a pointers to an entry of such a program in the program schedule database. The links to Internet websites include URL information to particular web pages. The links to news articles and local guide information include pointers to such entries in the new and hometown databases.

FIG. 4 is a schematic block diagram of the television system 10 of FIG. 1 operating under the control of a coordinator 200. Although the coordinator 200 in the embodiment illustrated in

FIG. 4 is depicted as a stand alone unit, the coordinator may, in alternative embodiments, be placed in the cable box 20, VCR 15, television 50, IRD box 20, or another device in communication with the television.

The coordinator 200 includes a processor (CPU) 202 and memory (RAM) 204. According to this embodiment, the channel mapping function is preferably stored in the CPU 202 instead of the microprocessor 150 of the television 50. Furthermore, the memory 204 preferably stores the EPG data instead of the television's EPG memory 145.

The coordinator 200 is connected to and controls an infrared (IR) emitter(s) 206. An IR receiver 208 connected to the coordinator 200 receives input from the viewer input device 40. In alternative embodiments, the IR emitter(s) 206 may be replaced by a bus interface, an RF transmitter, or the like.

The IR emitter(s) 206 controls one or more of the IRD box 25, television 50, VCR 15, cable box 20, and other inputs 30. Thus, the IR emitter 206 preferably acts as a remote control device by emulating remote control signals of the television 50, VCR 15, cable box 20, and/or other devices.

The viewer input device 40 also includes an IR transmitter 210 that controls the coordinator 200 via the IR receiver 208. Although, the coordinator 200 preferably performs all the necessary control functions of the system, the viewer input device 40 may work with the coordinator 200 to control the various system devices.

In creating the merged EPG guide, one or more television signal sources provide EPG data including television schedule information to the television system 10. One or more of these sources also provide channel mapping information for relating television stations to their respective channel allocations. According to one embodiment of the invention, the channel mapping information is transmitted over one or more designated television stations known as physical hosts. The channel mapping information transmitted by each physical host preferably includes the channel maps for most or all the television services carrying that physical host.

Accompanying each channel map is a channel map identifier (ID) that uniquely identifies the channel map applicable to each television service subscribed to by the user of the television system 10. Each channel map ID preferably corresponds to a zip code or group of zip codes because viewers in the same local geographic area generally receive the same OTA broadcast or subscribe to the same cable provider. Thus, a unique channel map ID may be provided for the channel map corresponding to a particular cable company servicing a particular zip code. A different channel map ID may be provided for the channel map corresponding to the OTA channels available in the same zip code.

In determining the channel maps applicable to the user's television system, the user is asked during an initial setup process to input his or her zip code. The user is further asked to

enter information about all the television services (signal sources) to which he or she subscribes. For instance, the user may be asked whether he or she has a cable box 20 and/or an IRD box 25, and may further be asked to provide information about any other television signal source being used. The user then invokes the channel mapping function stored in the coordinator 200 (or the television 50), through the viewer input device 40.

According to one embodiment of the invention, the channel mapping function causes the coordinator 200 to scan through the channels to locate a channel map selection packet preferably transmitted in the VBI portion of a television signal. The channel map selection packet preferably correlates channel map IDs to their respective signal source(s) and zip codes. A particular signal source and zip code combination may have more than one channel map ID associated with it. For instance, if two different cable companies with different channel maps service a particular zip code, each channel map will be associated with a different channel map ID.

Once the channel map selection packet is located, the coordinator 200 identifies the channel map ID corresponding to the zip code and signal source entered by the user. If only one channel map ID is identified for the zip code/signal source combination, the coordinator downloads the channel map corresponding to the identified channel map ID. If more than one channel map ID is identified for the combination, the user preferably selects the channel map which he or she would like to download. Alternatively, the selection is automatic based on information gathered during the channel scan.

FIG. 5 is a schematic block diagram of a channel map selection packet 230 and channel map packets according to one embodiment of the invention. Both channel map selection packets 230 and channel map packets 232 include a start code 234 and a stop code 236, respectively identifying the start and end of a packet. Each packet further includes a packet type code 238 identifying whether the packet is a channel map selection packet 230 or a channel map packet 232.

The channel map selection packet 230 further includes channel map selection information 240 relating channel map IDs 242 to one or more zip codes 244 and signal sources 245. Once the appropriate channel map IDs are identified based on the user's zip code and subscribed signal sources, the coordinator 200 next searches the remaining blocks of data for the start code 234, stop code 236, and data packet code 238 of the channel map packets 232. For each identified channel map packet 232, the coordinator 200 further examines a channel map ID code 246 for determining whether it corresponds to the channel map ID for the user's zip code and signal source. If it does, the coordinator 200 downloads to its memory 204 a channel map 248 with a channel lineup information. In the event that the user subscribes to multiple signal sources, the coordinator 200 preferably downloads the channel map for each signal source.

According to one embodiment of the invention, correlation of call letters of television stations (e.g. NBC, HBO, etc.) to particular television channel numbers for creating a channel lineup is done using the channel maps 248 in conjunction with one or more source maps. Each channel map 248 identifies a list of television channel numbers 250 with a channel identifier 252 composed of a source ID 252a and a reference number referred to as a guide channel number 252b. The source ID 252a identifies a source map with station call letter information. The guide channel number 252b identifies a reference number to one of the station call letters in the source map. Preferably, the coordinator downloads each of the source maps indicated in the downloaded channel maps.

FIG. 6 is a schematic block diagram of a plurality of source map packets 260 according to one embodiment of the invention. Each source map packet 260 includes a start code 262 and a stop code 264, respectively identifying the start and end of the packet. Each packet further includes a packet type code 266 identifying the packet as a source map packet, as well as a source ID 270. In addition, each source map packet 260 also includes a source map 268 of station call letters and/or network station IDs 272. Each station call letter 272 in the source map 268 is referenced by a guide channel number 270.

Different source maps preferably exist for different regions of the country. With an 8 bit guide channel number identifying the call letter of each station, up to 256 stations may be identified in a single source map. If a region allows for more than 256 stations, multiple source maps may be used for the region. In addition, a source map may only include stations carried by a particular signal source (e.g. only cable stations), or may include stations carried by multiple signal sources (e.g. both OTA and cable stations).

In the example illustrated in FIGS. 5 and 6, the channel map selection information 240 includes two channel map IDs for the cable signal source in zip codes 90000-90050 and 90210, and one channel map ID for the OTA signal source in the same range of zip codes. In the event the user has indicated a zip code within this range, and has further indicated that the user has a cable box, the user is given the choice of selecting between the two channel maps. For example, if the user subscribes to a cable company with a channel map corresponding to the channel map ID "2710," he or she would select to download this channel map.

For OTA broadcast, however, there is only one channel map in the user's zip code. Thus, the coordinator downloads the indicated channel map without further inquiry to the user. The coordinator also downloads the source map with the source ID 252a of "001" for correlating the television channel number 250 with the station call letters 272. The downloaded channel maps and source map together allow the television channels 250 to be correlated to their station call letters 272. For television channel number "2," the source map with source ID "001" indicates that the corresponding television station call letter is "ABC."

Once the coordinator 200 has identified and downloaded the channel map(s) 248 and source map(s) 268 applicable to the user, the coordinator 200 creates a merged channel map with any redundant channel listings removed. Redundant listings are preferably identified by comparing the channel IDs 252 in one downloaded channel map with the channel IDs in other downloaded channel maps. If the same channel ID 252 appears in another channel map, the listing is redundant and may be removed from one of the channel maps.

Referring again to the examples of FIGS. 5 and 6, the coordinator 200 creates a merged channel map based on the cable channel map (channel map ID "2710") and the OTA channel map (channel map ID "2712"). In creating the merged channel map, the coordinator examines the channel IDs in the OTA channel map with the channel IDs in the cable channel map, and identifies that the four channel IDs in the OTA channel map are equal to the first four channel IDs in the cable channel map. For example, both the OTA channel map and the cable channel map carry the "CBS" network station identified by channel ID "001 004". The OTA channel map carries the station on television channel number "9," whereas the cable channel map carries the same station on television channel number "14."

According to one embodiment of the invention, the coordinator 200 creates a merged channel map 280 with the redundant listings removed, as is illustrated in FIG. 7. The merged channel map 280 includes the television channel numbers 250, source IDs 252a, and guide channel numbers 252b selected from each channel map. The merged channel map 280 may also include the channel map IDs of the channel maps being used for each channel listing. In this way, the signal source of each listing may be identified.

The coordinator 200 may further sort the information in the merged channel map 280 according to any of a variety of sorting routines, including by numerical order, alphabetical order, subject matter, source, or any other predefined routine. Preferably, however, the order of listings in the merged channel map based on an extended display priority packet as described in U.S. Patent Application Ser. No. 09/473,574 (attorney docket number 36769), the contents of which are incorporated herein by reference. The merged channel map 280 then provides the channel lineup information and the program schedule information to be displayed on a merged EPG.

In an alternative embodiment of the invention, the merged channel map 280 is created using a merging system 220 that is separate from the television system 10 (e.g. at a head-end) as is illustrated in FIG. 8. Once the program schedule information has been merged and sorted according to a predetermined order, the merged program schedule information is provided to the television system 10, for example, on a satellite channel or on another transmission medium. The program schedule information is received in a format that is ready for immediate display.

The merging system 220 may receive EPG data from a variety of sources. For example, the data may be provided to the merging system 220 using a data line 201. The data line 201 may

be a line generally used for receiving television signals, such as a cable, or another type of data line such as a telephone twisted pair or an optical fiber line. The merging system 220 may also receive EPG data from a broadcast system 222. The broadcast system 222 may be a standard RF broadcast station or a satellite broadcast system. The merging system 220 may also be provided with program schedule information by manually inputting the desired data using any of a variety of user inputs 223. For example, a user may type the desired information into the system using a keyboard. The information may also be input from a recorded medium, such as a magnetic medium (e.g., floppy disk, magnetic tape) or an optical medium (e.g., optical compact disk).

The merging system 220 merges all of the provided program schedule information into a single program guide. Once merged, the program schedule information is transmitted by a signal transmitter 224 and received by a television signal receiver 225. The transmitter 224 may be a standard television broadcast station, a DBS system utilizing a relay satellite, a television cable system, or any other known signal broadcasting device. The signal may be transmitted over the vertical blanking interval of one or more television channels or transmitted over a dedicated channel.

A signal receiver 225, such as the television tuner 105, receives the merged schedule information, typically on a dedicated television channel, and displays it on a television display 206. The program information can also be provided as an overlay or a partial screen display on a user selected channel.

In creating the merged channel map via either the coordinator 200 or a separate merging system 202, various factors may be taken into account in determining which redundant listings to eliminate. According to one embodiment of the invention, priorities are attached to the various signal sources, and a listing in a channel map for a source with a higher priority is kept over a duplicate listing in a channel map for a source with a lower priority. For instance, priorities may be given based on the number of channel listings in the channel map. Channel maps with a higher number of channel listings are given a higher priority to reduce the switching from one source to another as the user switches channels. The priorities may alternatively be user-defined. Furthermore, priorities may be given on a channel-by-channel basis. For example, digital channels may be preferred over analog channels.

In a second embodiment of the invention, duplicate listings are eliminated based on the signal quality of the various sources. For example, the source with a stable picture quality may take precedence over another source carrying the same television station, but with an unstable picture quality. The stability of a picture quality is preferably measured based on mis-timed horizontal sync pulses. Specifically, a sync input signal is analyzed for the number of signal edges detected within a time interval, such as 80 microseconds. The time interval may be either fixed or programmable. Preferably, no error is flagged if the number of signal edges detected

within the time interval is one or two. However, an error is flagged if the number of edges detected is zero or three. The presence of a predetermined maximum number of errors indicates bad sync quality and hence, unstable picture quality.

Even if signals from two different sources have equal sync qualities, it may nevertheless be preferable to select one source over another based on other factors such as the perceived screen noise created by each source. Slightly snowy picture quality, for instance, is one example of a perceived noise that may not be detected by the sync quality measurement. Thus, in a third embodiment of the invention, an automatic sync control circuit in the tuner relays relative signal strength information that is used to determine whether the signal from one source is stronger than the signal from another source. The source with the strongest signal is then chosen as the source of a duplicate television station.

In a fourth embodiment of the invention the merged channel map 280 includes the channel listings from all the sources, including duplicate listings. The merged EPG viewed by the user, however, may simply include one listing indicating the television station call letters of the duplicate listings. When the user selects the television station from the merged EPG, any one of the sources carrying the selected station may be selected. Preferably, and to the extent possible, the tuner selects the source to which it is currently tuned. In this way, the switching from one source to another is minimized.

In a fifth embodiment of the invention, the EPG lists all duplicate channel listings. The user may then manually remove the duplicate listings from a channel lineup editor, and keep the listing from the desired signal source.

FIG. 9 is an illustration of a merged EPG screen 170 generated by the video processor 160 under the control of the microprocessor 150. The viewer invokes an EPG guide mode for displaying the EPG screen 170 by pressing a "guide" key on the viewer input device 40. The viewer returns to a full screen television mode by the same key or invoking a linked television program.

The EPG screen 170 is divided into a number of different display areas. A PIP window 172, a first panel ad window 174, and a second panel ad window 176 are arranged along the left side of screen 50. The remainder of the EPG screen 170 is typically occupied by an action key bar 178, a navigation bar 180, a grid guide 182, and an information box 184. In the embodiment illustrated in FIG. 4, the position of the windows, and other user interface features, including the action key bar 178, navigation bar 180 and grid guide 182, are fixed. In another embodiment of this invention, the position and size of the windows and other user interface features are customizable by the viewer.

The PIP window 172 displays real time broadcast programs or pre-recorded video clips produced by the PIP chip 140. A translucent overlay of the PIP window 172 can display a title,

channel (local number and/or station name), and status (locked or unlocked) of the PIP window 172.

The first and second panel ad windows 174 and 176 display advertisements for future telecast programs or for products and services. An advertisement for a future telecast program is linked to a time and channel of the program allowing the viewer to watch or record the program automatically by highlighting the advertisement and pressing a watch action button 178a or a record action button 178b,respectively.

Highlighting an advertisement for a product or service allows the viewer to read one or more pages about the product or service from the information box 184. Alternatively, the advertisement is linked to a time and channel of an infomercial allowing the viewer to watch or record the infomercial by highlighting the advertisement and pressing the watch action button 178a or the record action button 178b, respectively.

The viewer accesses television program schedule information by actuating a grid button 180a from a list of menu buttons listed on the navigational bar 180. Upon actuation of the grid button 180a, the grid guide 182 displays a list of television programs with their respective channel designations 182a in a series of program tiles. According to one embodiment of the invention, the channel designations 182a indicate the corresponding signal source (e.g., cable, OTA, etc.) or the geographic region represented by the channel (e.g. local network station).

In addition to the program tiles, the grid guide 22 includes advertisement tiles 190 with virtual channel advertisements. A virtual channel ad may promote, for instance, a current or future television program. Such a virtual channel ad for a television program is linked to a time and channel of the program allowing the viewer to watch or record the program automatically.

The viewer may access news articles by actuation of a news button 180b from the navigational bar 180. Similar buttons may also be provided for accessing information about past, present, and future sporting events, and local information guide of a particular geographical area.

Although this invention has been described in certain specific embodiments, many additional modifications and variations would be apparent to those skilled in the art. It is therefore to be understood that this invention may be practiced otherwise than as specifically described. Thus, the present embodiments of the invention should be considered in all respects as illustrative and not restrictive, the scope of the invention to be determined by the appended claims and their equivalents.

CLAIMS:

1. A method of eliminating redundant program listings in an electronic program guide, the electronic program guide displaying listings of television programs telecast from a plurality of signal sources, the method comprising:

receiving electronic program guide data including program scheduling information of the television programs telecast from each of the signal sources;

receiving channel mapping information for each of the signal sources, the channel mapping information relating television channels to television stations carried by the signal sources;

creating a merged channel map based on the channel mapping information;

identifying a duplicate television station listing in the merged channel map;

removing the duplicate television station listing from the merged channel map; and

creating a merged electronic program guide based on the merged channel map.

2. The method of claim 1, wherein the channel mapping information includes listings of television channels and their associated channel identifiers, and identifying a duplicate television station listing comprises identifying a duplicate channel identifier listing.

3. The method of claim 1 further comprising displaying the merged electronic program guide.

4. The method of claim 1 further comprising transmitting the merged electronic program guide to a television system.

5. The method of claim 1, wherein the removing the duplicate television station listing comprises:

identifying a priority associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified priority is lower than the priority associated with another signal source carrying the same television station listing.

6. The method of claim 1, wherein the removing the duplicate television station listing comprises:

identifying a quality associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified quality is lower than the signal quality associated with another signal source carrying the same television station listing.

7. A system for eliminating redundant program listings in an electronic program guide, the electronic program guide displaying listings of television programs telecast from a plurality of signal sources, the system comprising:

means for receiving electronic program guide data including program scheduling information of the television programs telecast from each of the signal sources;

means for receiving channel mapping information for each of the signal sources, the channel mapping information relating television channels to television stations carried by the signal sources;

means for creating a merged channel map based on the channel mapping information;

means for identifying a duplicate television station listing in the merged channel map;

means for removing the duplicate television station listing from the merged channel map; and

means for creating a merged electronic program guide based on the merged channel map.

8. The system of claim 7 further comprising means for displaying the merged electronic program guide.

9. The system of claim 7 further comprising means for transmitting the merged electronic program guide to a television system.

10. A system for eliminating redundant program listings in an electronic program guide, the electronic program guide displaying listings of television programs telecast from a plurality of signal sources, the system comprising:

a receiver configured to receive channel mapping information associated with at least one of the signal sources, the channel mapping information relating television channels to television stations carried by the signal source;

a processor coupled to the receiver and operable to execute program instructions, the program instructions including:

creating a merged channel map based on the channel mapping information;

identifying a duplicate television station listing in the merged channel map;

removing the duplicate television station listing from the merged channel map; and

creating a merged electronic program guide based on the merged channel map.

11. The system of claim 10, wherein the channel mapping information includes listings of television channels and their associated channel identifiers, and identifying a duplicate television station listing comprises identifying a duplicate channel identifier listing.

12. The system of claim 10 further comprising a display screen for displaying the merged electronic program guide.

13. The system of claim 10, wherein the receiver is located at a head-end, and the system further comprises a means for transmitting the merged electronic program guide to a television system.

14. The system of claim 10, wherein the program instruction for removing the duplicate television station listing comprises program instructions for:

identifying a priority associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified priority is lower than the priority associated with another signal source carrying the same television station listing.

15. The system of claim 10, wherein the program instruction for removing the duplicate television station listing comprises program instructions for:

identifying a quality associated with the signal source carrying the duplicate television station; and

removing the duplicate television station listing if the identified quality is lower than the signal quality associated with another signal source carrying the same television station listing.

FIG. 1

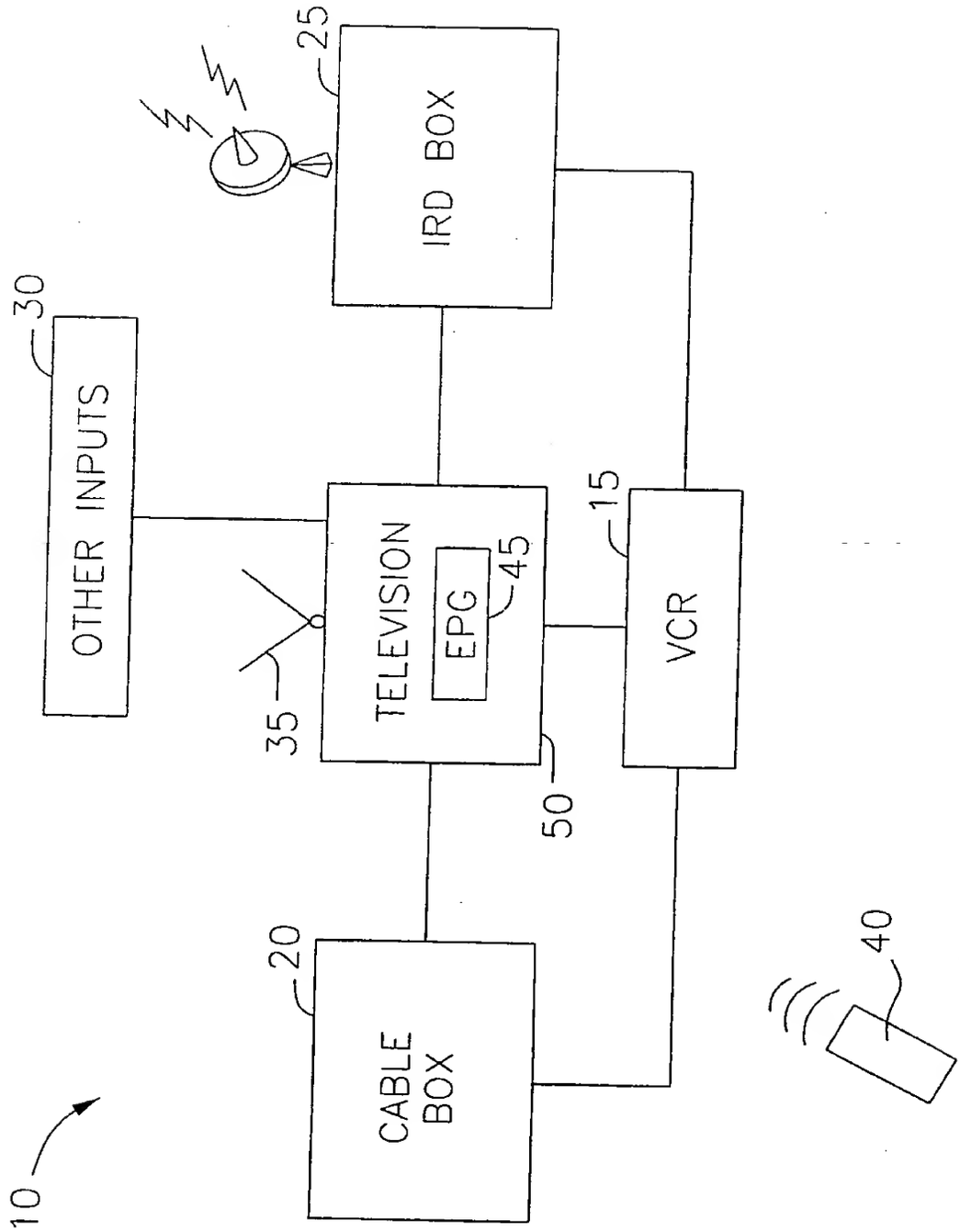
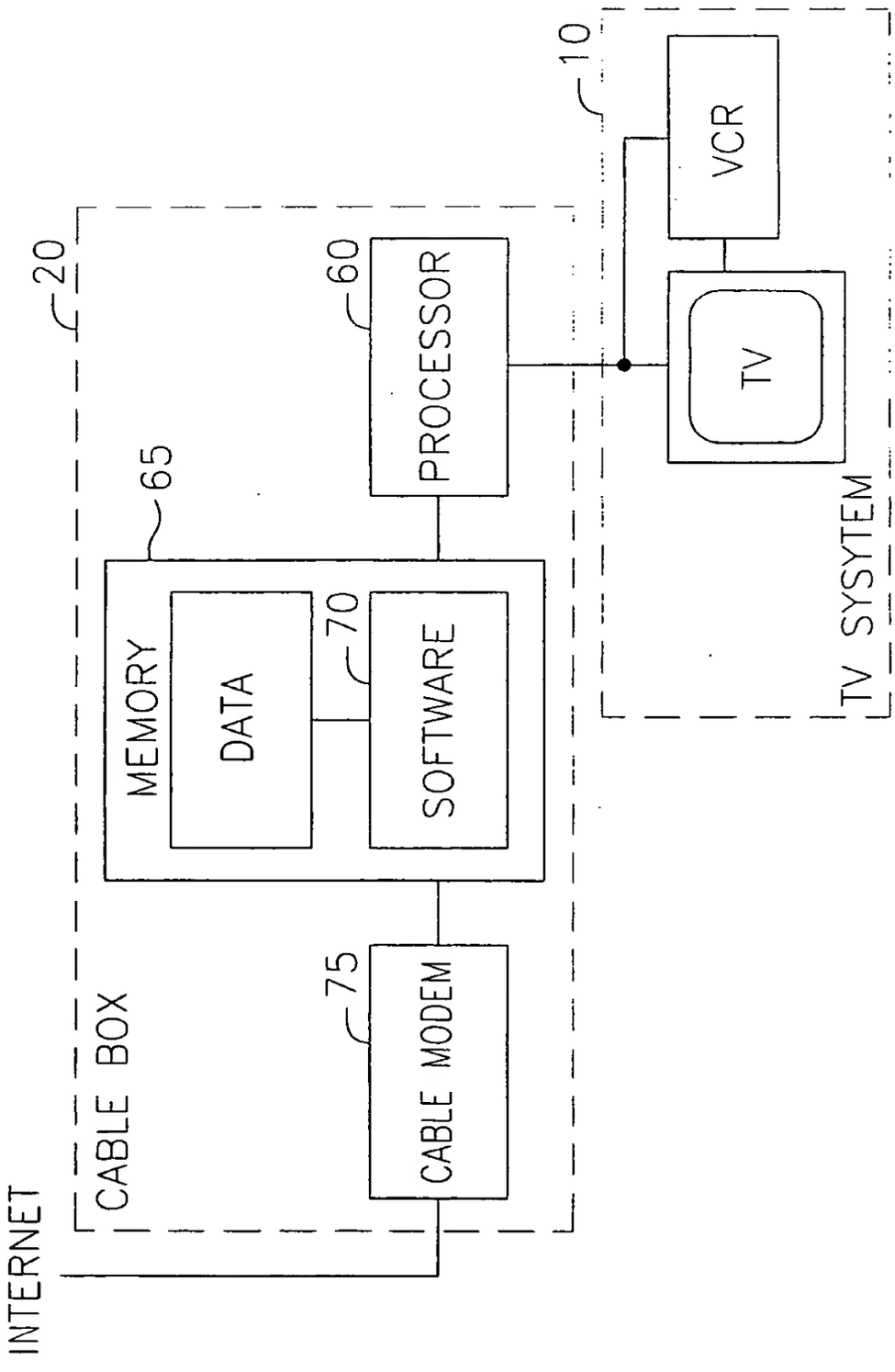

10
CABLE BOX
20
OTHER INPUTS
30
IRD BOX
25
TELEVISION
EPG
45
35
50
VCR
15
40

FIG. 2


INTERNET
CABLE BOX
20
CABLE MODEM
75
MEMORY
65
DATA
70
SOFTWARE
PROCESSOR
60
10
VCR
TV
TV SYSYTEM

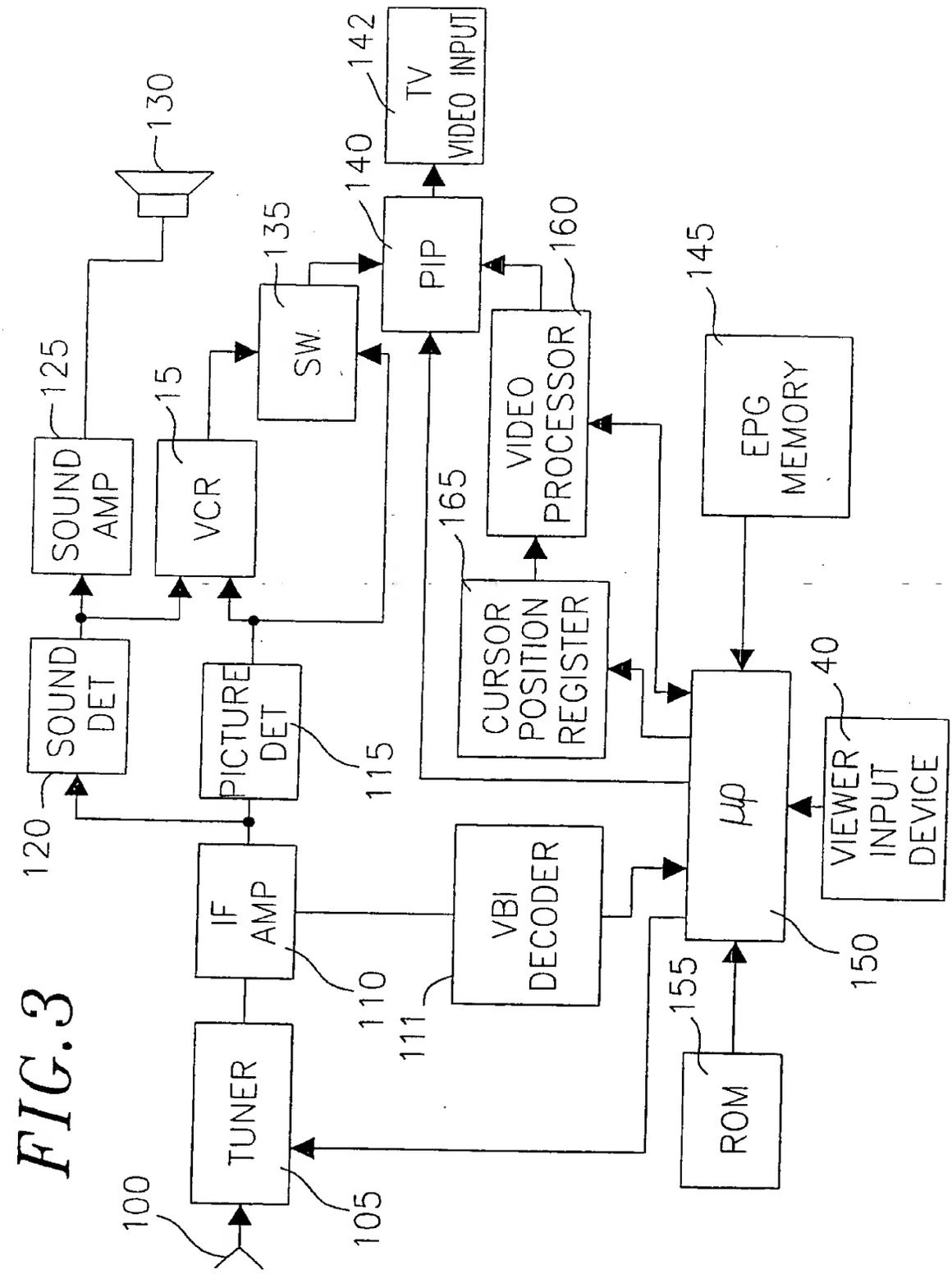

100
TUNER
105
IF AMP
110
120
SOUND DET
PICTURE DET
115
VBI DECODER
111
μp
150
ROM
155
VIEWER INPUT DEVICE
40
CURSOR POSITION REGISTER
165
VIDEO PROCESSOR
160
EPG MEMORY
145
PIP
140
TV VIDEO INPUT
142
SW
135
VCR
15
SOUND AMP
125
130

FIG. 3

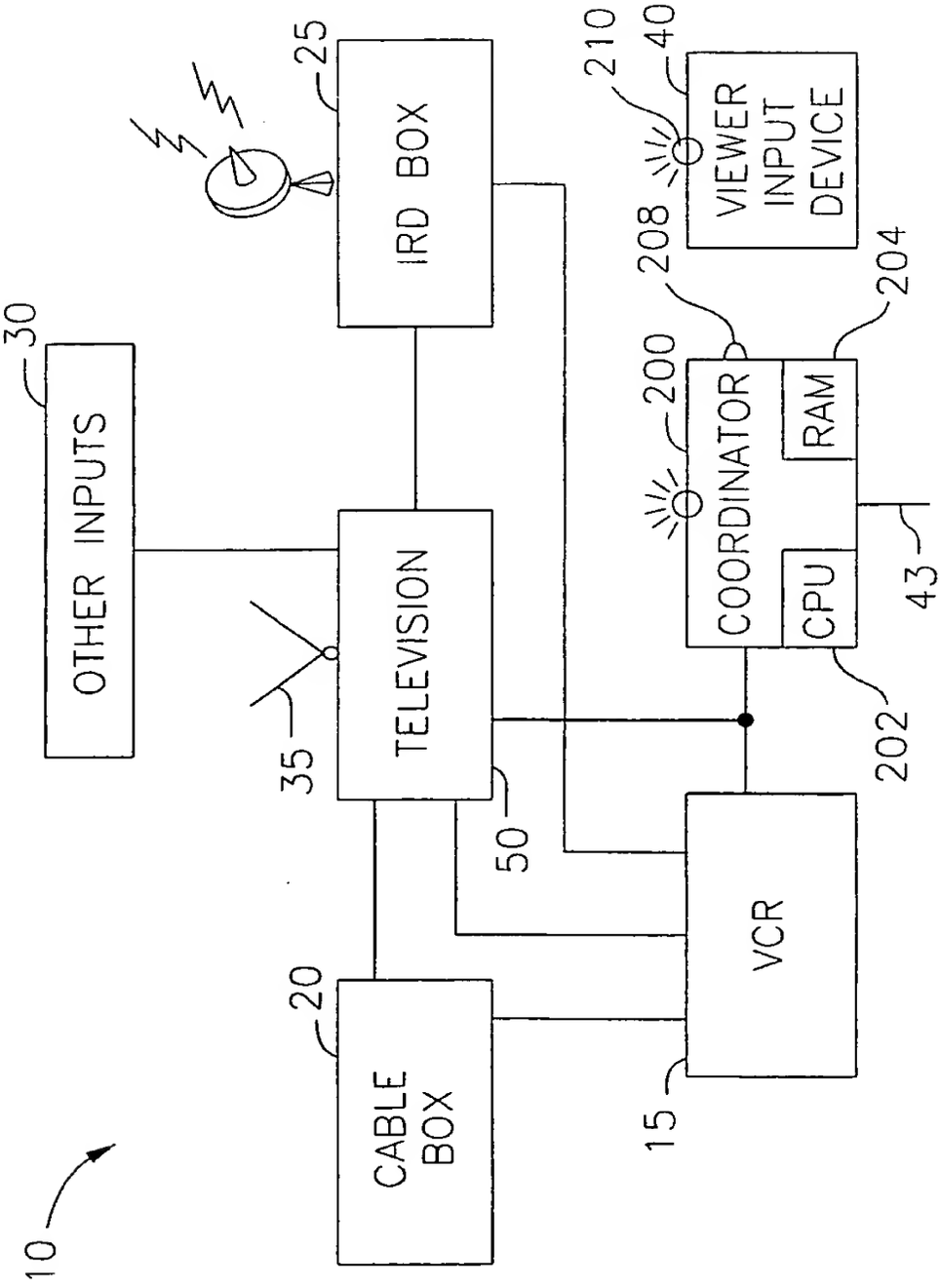
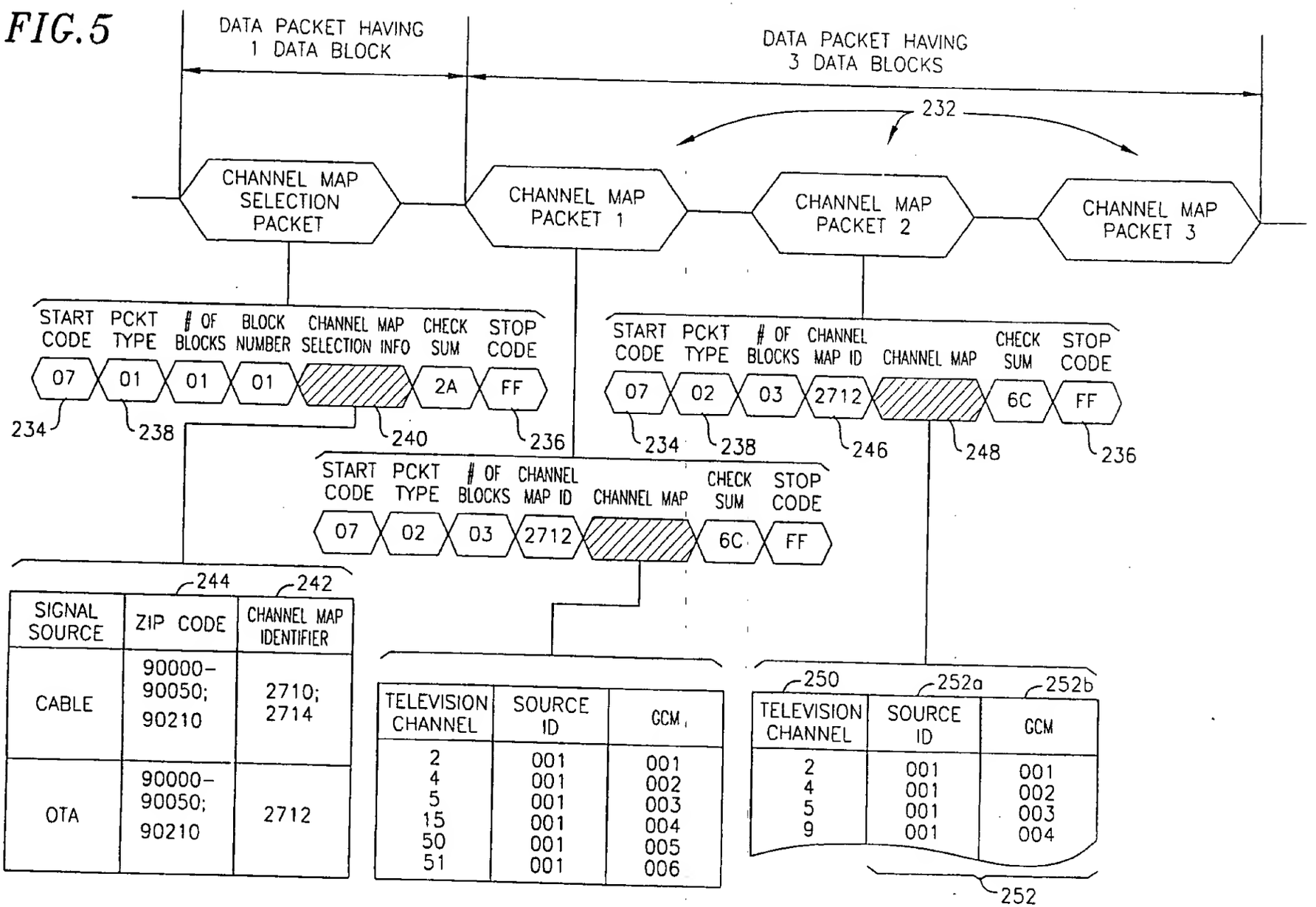

10
CABLE BOX
20
VCR
15
50
TELEVISION
35
OTHER INPUTS
30
IRD BOX
25
COORDINATOR
200
RAM
204
CPU
202
43
208
VIEWER INPUT DEVICE
210
40

FIG. 4

FIG.5



SUBSTITUTE SHEET (RULE 26)

FIG. 6

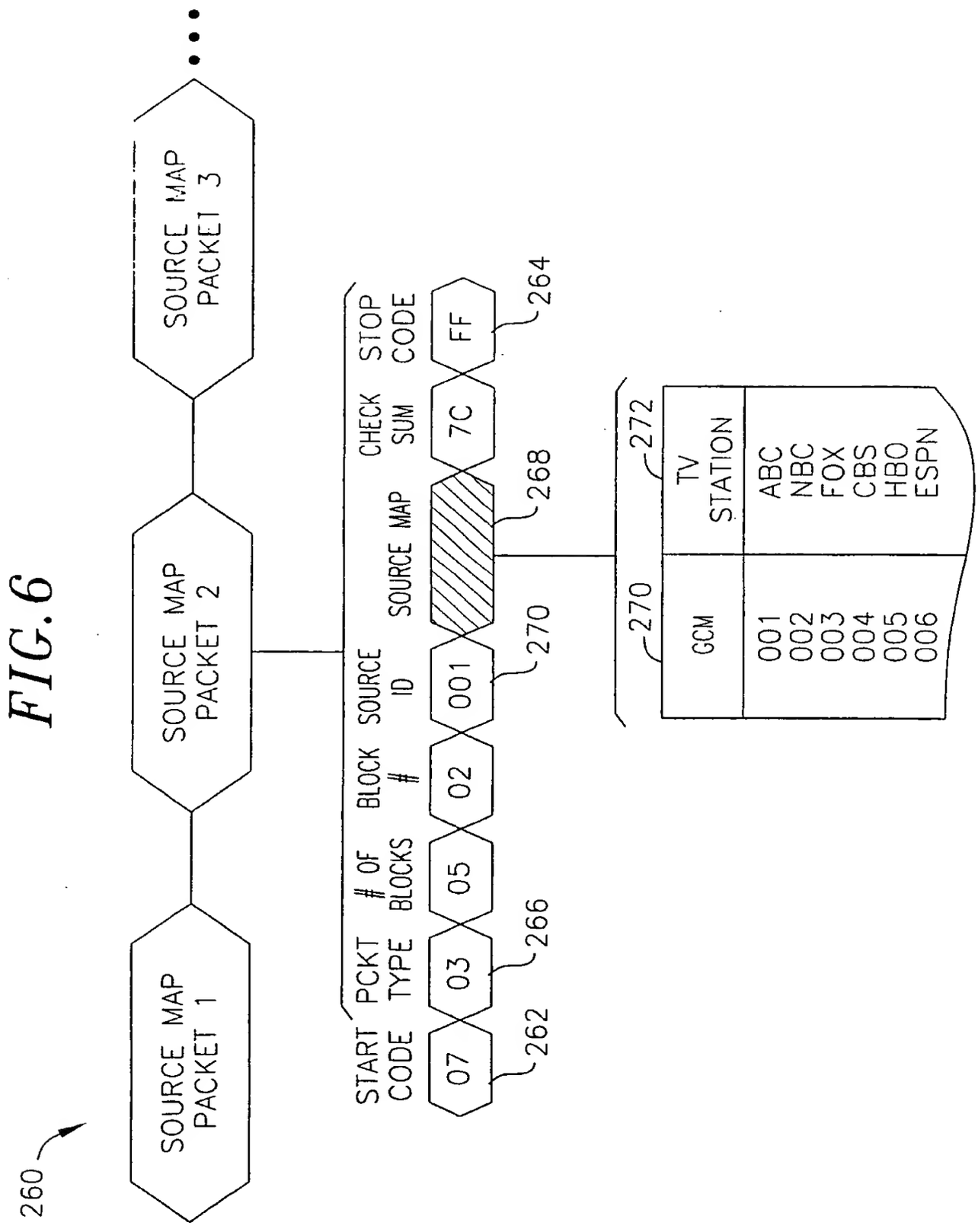
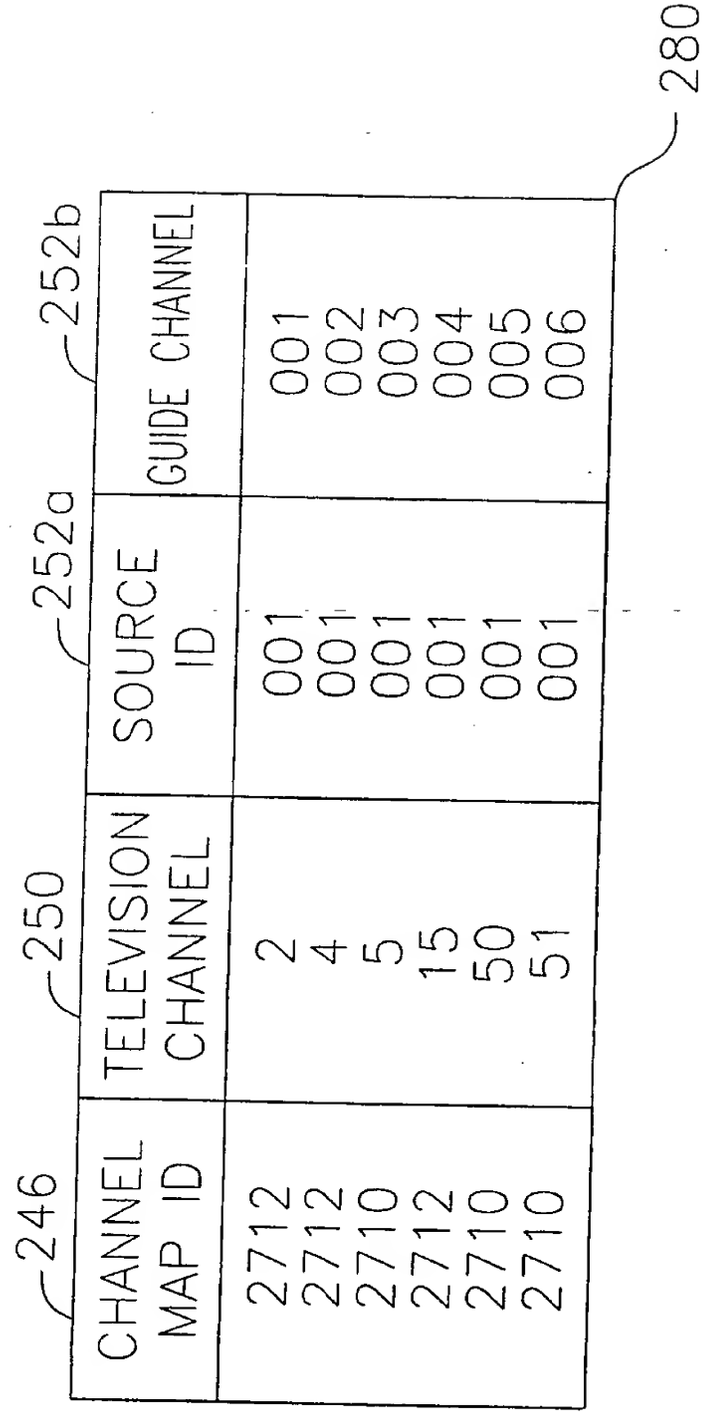

260
SOURCE MAP PACKET 1
SOURCE MAP PACKET 2
SOURCE MAP PACKET 3
START CODE
PCKT TYPE
OF BLOCKS
BLOCK #
SOURCE ID
SOURCE MAP
CHECK SUM
STOP CODE
07
03
05
02
001
7C
FF
262
266
270
268
264
270
272
GCM
TV STATION
001 ABC
002 NBC
003 FOX
004 CBS
005 HBO
006 ESPN

FIG. 7


246
250
252a
252b
280
CHANNEL MAP ID
TELEVISION CHANNEL
SOURCE ID
GUIDE CHANNEL
2712 2 001 001
2712 4 001 002
2710 5 001 003
2712 15 001 004
2710 50 001 005
2710 51 001 006

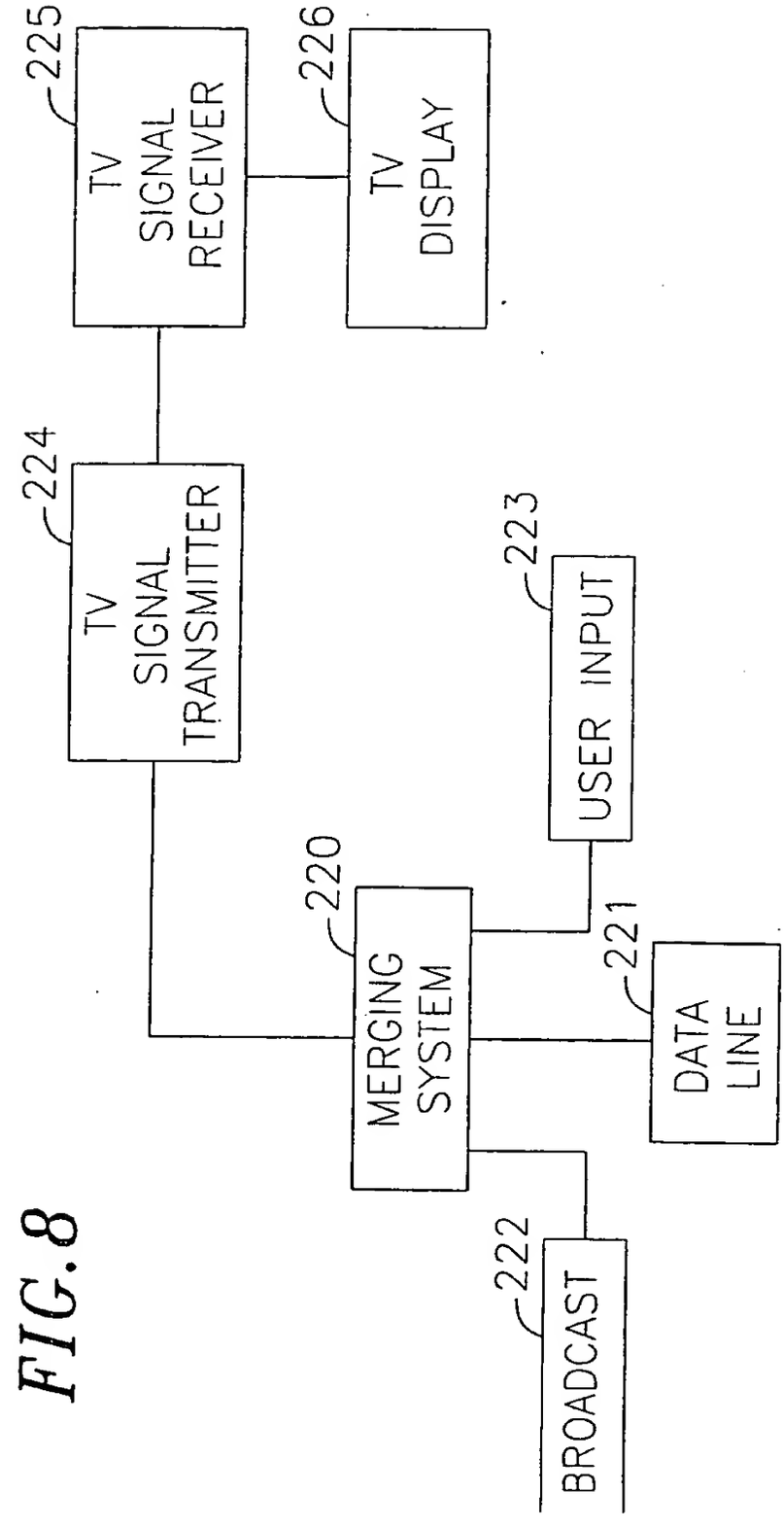

225
TV SIGNAL RECEIVER
226
TV DISPLAY
224
TV SIGNAL TRANSMITTER
223
USER INPUT
220
MERGING SYSTEM
221
DATA LINE
222
BROADCAST

FIG. 8

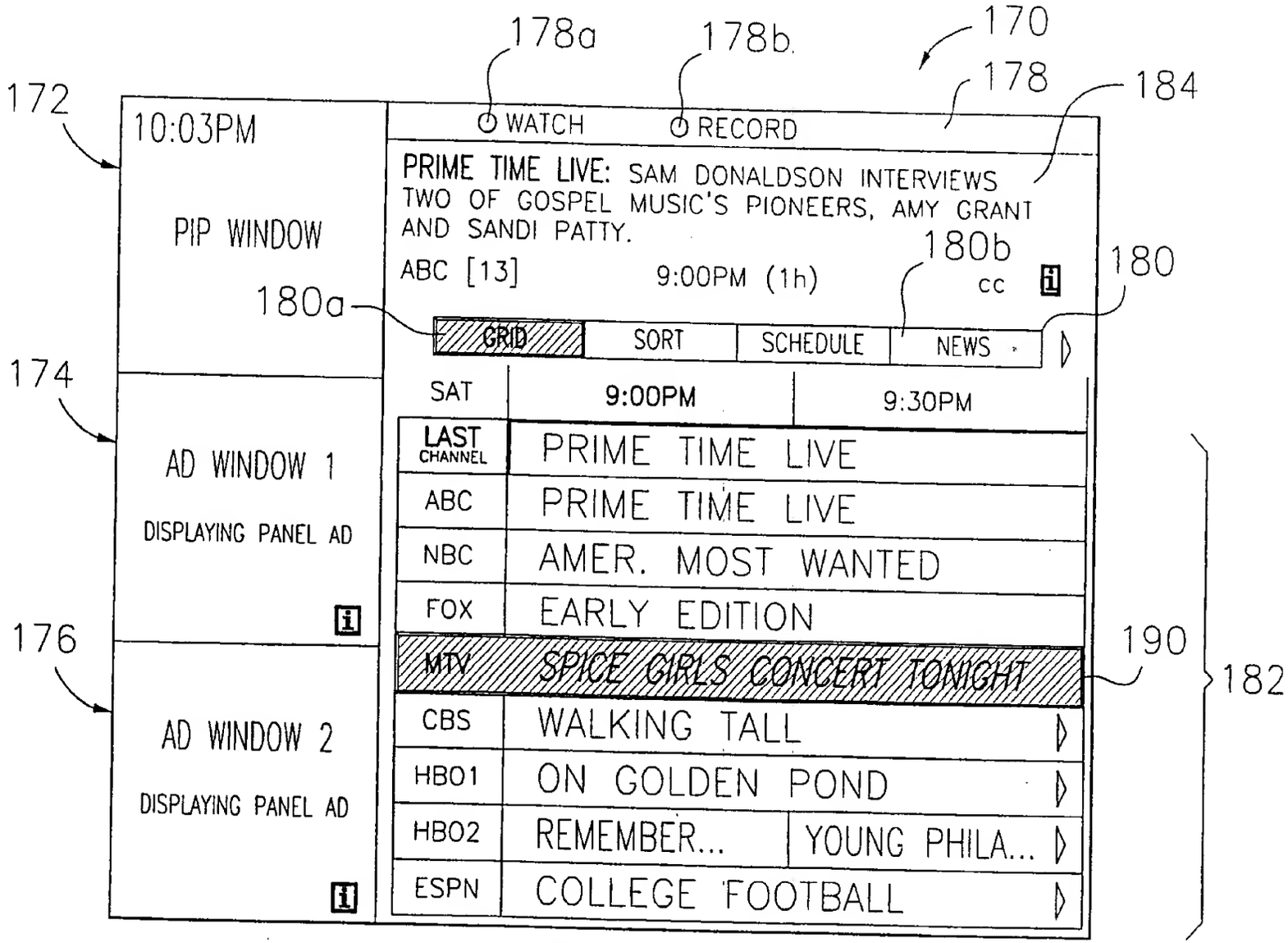


FIG. 9

SUBSTITUTE SHEET (RULE 26)

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/US 00/05183

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/445

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 828 945 A (KLOSTERMAN BRIAN LEE) 27 October 1998 (1998-10-27) column 3, line 31 - line 37	1,7,10
A	column 7, line 21 - line 32	2-4,8,9, 11,12
A	WO 97 25813 A (INDEX SYSTEMS INC ;CHANG ALLEN (US); KWOH DANIEL S (US); YUEN HENR) 17 July 1997 (1997-07-17) the whole document	1-15
A,P	EP 0 912 054 A (GEN INSTRUMENT CORP) 28 April 1999 (1999-04-28) the whole document	5,14

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 June 2000	30/06/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk	

INTERNATIONAL SEARCH REPORT

information on patent family members

Inte. onal Application No
PCT/US 00/05183

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